Supplemental Material: Scheduling with Package Auctions

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1 Experimental Instructions for VCG

Player ID: _____
Player Type: _____
Computer #: _____

Instruction

You are about to participate in an economics experiment in which you will earn money based on the decisions you and others make. All earnings you make in the experiment are yours to keep. Please do not talk to each other during the experiment. If you have a question, please raise your hand and the experimenter will come and help you.

Overview

- All values and prices will be stated in francs. Each franc you earn can be converted into US currency at the rate specified by the experimenter. The exchange rate **is 12 francs (₣) per dollar ($)**.
- In this experiment, you will participate in a series of auctions that allocates time use of a major piece of scientific equipment. The computer will be the auctioneer and you will compete against 8 other people in the room.
- If you win a time slot at the end of an auction, your profit will be the difference between your value of that time slot and the price you pay for it. If you do not win any time slot, your profit will be zero. Therefore, for you:

  $$\textbf{Profit} = \textbf{value} - \textbf{final price}.$$

  Please note that your profit, which will be used to determine a portion of your payment for the experiment, depends on the **difference** between your value and the final price, **not** your value alone.
- At the end of each auction, you will fill out your Auction Worksheet and a monitor will verify your earnings.

Background

You are one of nine scientists who are bidding for access time to a piece of major scientific equipment. Three researchers are conducting big projects, which require at least 3 months of equipment time to complete, while six researchers are conducting smaller experiments that require at least 2 months to complete. The time slots (also called packages) on which you will be bidding are composed of consecutive months within a 24-month timeframe. You only have one experiment that you want to run. No matter how many packages you bid on, you will never be allocated more than one package.

Value Determination

You will have a unique value for each time slot (package) depending on when you are able to start using the equipment as well as the length of time for which you can use your equipment.

The values of the various time slots to different researchers depend on several factors.

1. *Value for each minimum package for a small researcher* (2 months) is randomly drawn from the set of integers between 20 and 100, inclusive, where each integer is equally likely to be drawn. A package of fewer than 2 months is worth zero to a small researcher.

2. *Value for each minimum package for a big researcher* (3 months) is randomly drawn from the set of integers between 20 and 150, inclusive, where each integer is equally likely to be drawn. A package of fewer than 3 months is worth zero to a big researcher.

3. *Value for each additional month* is randomly drawn from the interval between 10 and 20, inclusive. Both sets of researchers get added value from using the equipment for more time than the absolute minimum. Small researchers derive more value from using the equipment for 3 months instead of 2, and the most value from using the equipment for 4 months. Using the equipment for five or more months, however, gives them no more value than just using it for four months. Similarly, large researchers get more value from 4 months of use of the equipment as opposed to 3, and they get the most value from using the equipment for 5 months. More than 5 months of time, however, does not give them any additional value.

4. *Starting month*: If your player ID starts with the digit 3, 7, 8, or 9, you prefer to use the equipment earlier rather than later. If your player ID starts with the digit 2, 5, or 6, you are indifferent between starting earlier and later. Finally, if your player id starts with the digit 1 or 4, you prefer to start later rather than earlier.

For each participant, the various components of his or her value will be randomly drawn in each auction. Whether you are a big or small researcher, and whether you prefer to start earlier or later will already be taken into account in the values for packages that you see on your screen.

Auction Process

The experiment may have several auctions. For each auction, you may bid on packages. At the end of each auction, you will see if the bids that you submitted were winning or losing.

Months and Packages

In the experiment, you can only bid on packages, but packages are constructed from individual months. In this case, there are 24 different months. The packages are all the

possible ways in which the months can be put together in consecutive order with lengths of 2, 3, 4 for a small researcher and lengths 3, 4, 5 for a big researcher.
The starting month and the length of the package uniquely identify a package. For example, if a package starts on month 1 and lasts for three months, it consists of month 1, month 2, and month 3.

Submitting an Order

The packages will be presented to you in a table format. The different rows will represent different starting months, and the different columns will represent different durations. For example, to find a package that starts on the 4th month, and lasts for 3 months, you will first look for the row that is labeled 4, and find the column that is labeled 3.
In each cell, you will see the value of that package to you. If you wish to bid on that package, you can submit a price in the textbox and then click on the submit button. Note that you will need to click the submit button for each time that you submit a bid. Refer to Figure 1 below to see how your screen will look during the submission process.
You are allowed to submit a price for a package that is higher than your value for that package, but if you end up winning the package, you may make a negative profit. **If you earn a negative profit for an auction, that amount will be deducted from your experiment pay. If your cumulative earning becomes negative, that is, if the sum of your show up fee, quiz score, and profit from participating in the experiment is negative, you will be asked to leave the experiment**.

Canceling an Order

You can always cancel a bid before you click on the "All Done" button. You can do this by clicking on the "Cancel" button for the bid that you want to cancel.

All Done Button

Once you have submitted all the bids for a round, please click on the "All Done" button. You do not have to wait until time runs out before pressing the button. You will be instructed to wait until all the other players have clicked on the "All Done" button.

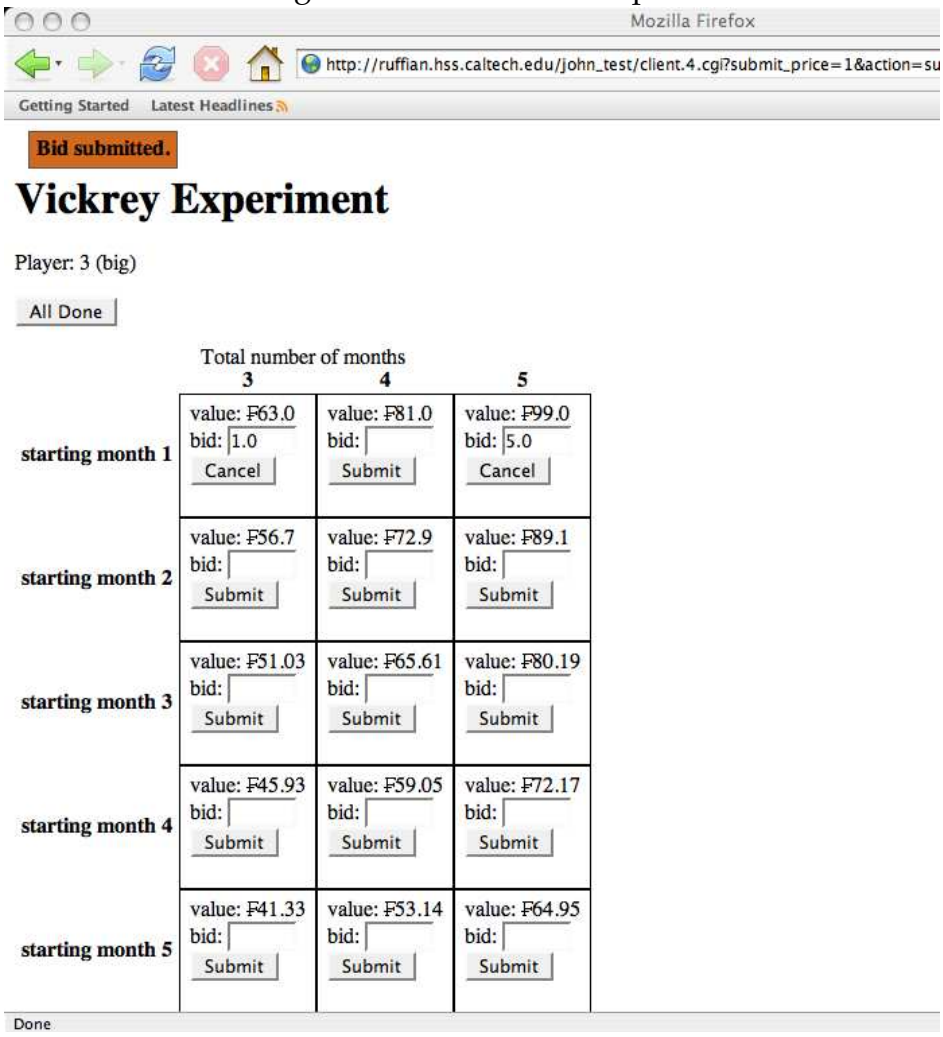
The Solver

At the end of each auction the solver will determine which bids are the winning bids. The solver selects the combination of bids that maximizes the revenue to be received. For simplicity, in all subsequent examples, we assume that there are only three months, and the minimum package is one month.

Example: At the end of an auction, the following bids have been submitted:

Bidder 1: {month 1, month 2, month 3} = 200
Bidder 2: {month 1} = 100
Bidder 3: {month 2, month 3} = 75

Figure 1: Submission Sample



The solver can choose to allocate the months in two different ways.

1. Give month 1, month 2, and month 3 to Bidder 1. The total revenue is 200.
2. Give month 1 to Bidder 2 and month 2 and month 3 to Bidder 3. The total revenue is 175.

Since the first allocation gives a higher total revenue, the solver will make Bidder 1 the winning bidder of month 1, month 2, and month 3.

The Rebate

The amount that the winning bidders are required to pay at the end of the auction depends on the additional revenue that each bidder generated, which is calculated by comparing the revenue obtained by the auctioneer, versus the revenue obtained by the auctioneer when the given bidder was ignored.

Example: At the end of an auction, the following bids have been submitted:

Bidder 1: {month 1, month 2, month 3} = 200, {month 1} = 80
Bidder 2: {**month 1**} **= 100**, {month 1, month 2}=120
Bidder 3: {**month 2, month 3**} **= 150**, {month 3} = 80

The winning bids are Bidder 2's bid and Bidder 3's bid, because they generate the highest revenue $100 + 150 = 250$.

However, the auctioneer does not ask Bidder 2 to pay 100. Suppose that Bidder 2 were ignored. The winning bids then become Bidder 1's bid on (month 1) and Bidder 3's bid on (month 2, month 3).

Bidder 1: {month 1, month 2, month 3} = 200, {**month 1**} **= 80**
~~Bidder 2: {month 1} = 100, {month 1, month 2}=120~~
Bidder 3: {**month 2, month 3**} **= 150**, {month 3} = 80

Then the auctioneer calculates the revenue that those winning bids would generate, which is $80 + 150 = 230$. Thus, the additional revenue that Bidder 2 makes is 20, since $250 - 230 = 20$. This 20 is the rebate for Bidder 2. Therefore, Bidder 2 pays 100 and receives 20 back. His final price is 80.

Similarly, Bidder 3 might not have to pay 150. When Bidder 3 is ignored, the winning bid is Bidder 1's bid on (month 1, month 2, month 3).

Bidder 1: {**month 1, month 2, month 3**} **= 200**, {month 1} = 80
Bidder 2: {month 1} = 100, {month 1, month 2}=120
~~Bidder 3: {month 2, month 3} = 150, {month 3} = 80~~

The revenue to the auctioneer would be 200. Therefore, the additional revenue that Bidder 3 generates is 50, since $250 - 200 = 50$. The rebate for Bidder 3 is 50. Bidder 3 pays 150 and receives the rebate of 50. Thus, Bidder 3's final price is 100.

Notice that your final price depends on other bidders' bids, which you cannot observe during the auction.

Timing

For each auction, you will be given up to 7 minutes to submit your bids. An experimenter will alert you when your time for each auction is up and will ask you to click the "All Done" button if you have not already.

Auction Results

At the end of each auction, please record your winning package, if any, the value you have for that package, and your profit.

Special Notes

We do not offer any guarantees that the software will not crash. When the computer crashes there may be some excitement, but there is no need to panic.

Worksheet

Please fill out the worksheet completely as instructed. Your values are private information. Please do not reveal them to anyone.

At the end of the auction the owner of each package will receive his or her profit. Again, this is calculated in the following way:

$$\textbf{Profit} = \textbf{value} - \textbf{final price}.$$

There will be a total of 8 auctions. Your total profit will be the sum of profit in each of the 8 auctions.

Player ID: _____
Player Type: Big or Small (circle one)
Computer #: _____

Review Questions:

(You will be **paid** the specified amount for each correct answer.)

Q.1 Number of winning bids. ($0.50)

a) ($0.25) What is the minimum number of **winning bids** you may have at the **end** of the auction?

b) ($0.25) What is the maximum number of **winning bids** you may have at the **end** of the auction?

Q.2 Winning Bids ($1)

Suppose the bids submitted by four bidders are as listed in the table below. Which set of bids will be the winning bids?

	Package	Bid
Bidder 1	1–2	₣30
Bidder 2	1–2	₣20
Bidder 3	1–4	₣60
Bidder 4	3–5	₣40

Q.3 Rebate ($1)

Suppose the bids submitted by four bidders are as listed in the table below.

	Months	Bid
Bidder 1	1–3	₣30
Bidder 2	1–3	₣50
Bidder 3	2–5	₣70
Bidder 4	4–5	₣50

The winning bids are Bidder 2's bid and Bidder 4's bid, because they generate the highest revenue $50 + 50 = 100$. To compute the rebate for Bidder 2, let us ignore Bidder 2's bid.

a) ($0.25) Which set of bids will be the winning bids if Bidder 2's bid was ignored?

b) ($0.25) How much is the revenue that those winning bid(s) would generate?

c) ($0.25) How much is the additional revenue that Bidder 2 generates?
(Hint: The highest revenue is 100 when Bidder 2's bid is not ignored.)

d) ($0.25) How much is the final price for Bidder 2?
(Hint: The final price = Bid – Rebate)

Player ID: _____
Player Type: Big or Small (circle one)
Computer #: _____

Earning Work Sheet:

Auction #	Winning Package (starting month, package length)	Value	Profit
Example	(2,3)	100	20
Auction 1			
Auction 2			
Auction 3			
Auction 4			
Auction 5			
Auction 6			
Auction 7			
Auction 8			
Total		Auction Profit=	

(_____ / _____) + _____ + _____ = _____
Auction Profit Exchange Rate Quiz Score Show Up Fee Total Earning
I

2 Experimental Instructions for Knapsack

Player ID: _____
Player Type: _____
Computer #: _____

Instruction

[The same as above]

Overview

- All values and prices will be stated in francs (₣). Each franc you earn can be converted into US currency at the rate specified by the experimenter. The exchange rate **is 20 francs (₣) per dollar ($)**.
- In this experiment, you will participate in an allocation process that allocates time use of a major piece of scientific equipment. The computer will be the coordinator of the process and you will compete against 8 other people in the room.
- If you are allocated a time slot, your earnings will be the value of that time slot. If you do not receive any time slot, your earnings will be zero.

  Profit = value of the package you get.

- After each allocation is completed, you will fill out your Worksheet and a monitor will verify your earnings.

Background

[The same as above]

Value Determination

[The same as above]

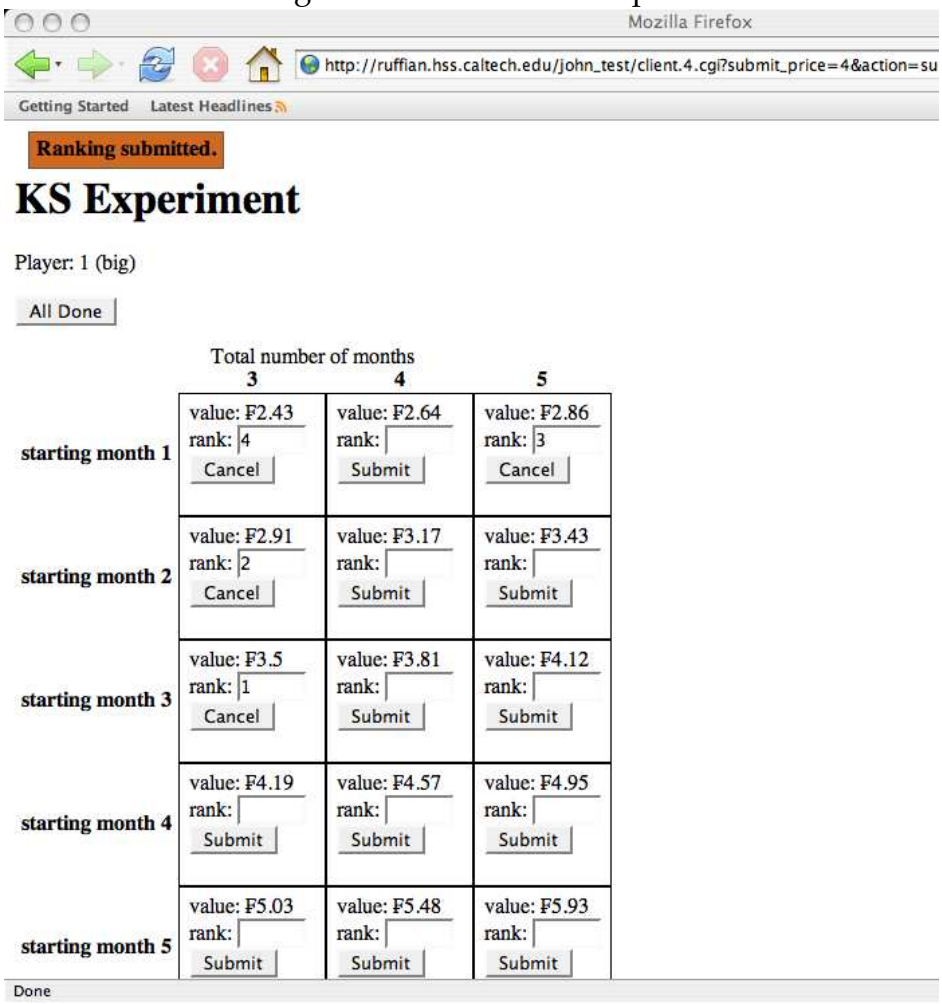
Allocation Process

In the experiment, you can only rank packages, but packages are constructed from individual months. [The remaining part is the same as above]

Submitting an Order

The packages will be presented to you in a table format. The different rows will represent different starting months, and the different columns will represent different durations. For example, to find a package that starts on the 4th month, and lasts for 3 months, you will first look for the row that is labeled 4, and find the column that is labeled 3.
To submit your rankings, you will rank packages using integers between 1 and 200. You will be asked to rank fewer than 200 packages, but you are given extra integers so that you have flexibility in how you assign rankings. Specifically, you will assign an integer to each package that you think you want to get. Since these numbers are rankings, if you assign a package "1", the coordinator will interpret this as your first-choice package. You can choose and rank packages in any order of your preference.
In each cell, you will see the value of that package to you. If you wish to submit a rank for that package, you can type a number in the textbox and then click on the submit button. Note that you will need to click the submit button for each time that you submit a ranking. Refer to Figure 1 below to see how your screen will look during the submission process.

Figure 2: Submission Sample



Canceling an Order

You can always cancel a ranking before you click on the "All Done" button. You can do this by clicking on the "Cancel" button for the ranking that you want to cancel.

All Done Button

Once you have submitted all your rankings, please click on the "All Done" button. You do not have to wait until time runs out before pressing the button. You will be instructed to wait until all the other players have clicked on the "All Done" button.

The Solver

After all participants have submitted their rankings, the solver will determine how to allocate the months. The solver goes though the following three steps to do so:

1. translate ranks submitted by a participant into consecutive numbers,
2. convert the consecutive numbers into points, and
3. find the allocation that maximizes the total points.

1. Translation

For each participant, the solver changes the submitted ranks into consecutive numbers.

> Example: Suppose that a participant has submitted the following ranks shown in the left column of the table below.

	Rank	
Package	Before translation	After translation
{month1, month2, month3}	5	2
{month2, month3, month4}	2	1
{month2, month3}	6	3
{month1, month2}	10	4

> This participant ranks 4 packages with the numbers 5, 2, 6 and 10, or $2 < 5 < 6 < 10$ when sorted in increasing order. These ranks are translated into 1, 2, 3 and 4 based on the order. Thus, the ranking $(5, 2, 6, 10)$ is changed to $(2, 1, 3, 4)$.

When the solver translates submitted ranks, it will not assign two packages the same number. If a participant assigns the same rank to more than one package, the solver will randomly break the tie and translate the rank into two different numbers.

> Example: Suppose that a participant has submitted the following ranks shown in the left column of the table below.

Package Package	Rank Before translation	After translation (possibility 1)	After translation (possibility 2)
{month1, month2}	10	4	4
{month2, month3}	5	2	3
{month3, month4}	5	3	2
{month2, month3, month4}	1	1	1

As seen in the table, this participant ranks 2 packages as rank 5. The rank of the package {month2, month3, month4} remains 1, as there is no other package ranked with 1. The solver, however, randomly selects the two packages {month2, month3} and {month3, month4} in sequence and changes the rank into 2 and 3. The table above shows two possible results of this randomization process, and each of the results is equally likely to happen. Finally, the solver changes the rank for package {month1, month 2} into 4.

2. Conversion

The solver converts all numbers into points for each participant based on the translated rank. The package labeled as 1 in the translated rank will get 66 points, and the next package labeled as 2 will get 65 points and so forth. The solver gives points in this way to all of the packages for which a participant has submitted a ranking.

Example: Suppose that a participant has submitted ranks for 4 packages as shown in the table below.

Package	Rank Before translation	After translation	Points
{month1, month2}	5	2	65
{month2, month3}	2	1	66
{month3, month4}	6	3	64
{month2, month3, month4}	10	4	63

The solver assigns 66 points through 63 points to the packages according to the translated ranks.

3. Maximization of Points

After the solver goes through the two steps above for each participant, it selects the allocation that maximizes the aggregate points. For simplicity, in all subsequent examples, we assume that there are only three months, and that the minimum package is one month.

Example: The following rankings have been submitted:

Participant	Package	Points
Participant 1	{month1, month2, month3}	66
	{month1, month2}	65
	{month1}	64
Participant 2	{month2, month3}	66
Participant 3	{month1}	66
	{month2, month3}	65

Note that this table shows only points, omitting the rankings submitted by the participants. The solver can choose to allocate the months in five different ways.

1. Give month 1, month 2, and month 3 to Participant 1. The total points are 66.
2. Give month 1 and month 2 to Participant 1. The total points are 65.
3. Give month 1 to Participant 1 and month 2 and month 3 to Participant 2. The total points are 130 = 64 + 66.
4. Give month 1 to Participant 1 and month 2 and month 3 to Participant 3. The total points are 129 = 64 + 65.
5. Give month 1 to Participant 3 and month 2 and month 3 to Participant 2. The total points are 132 = 66 + 66.

Since the last allocation gives the highest total points, the solver will allocate month 1 to Participant 3 and month 2 and month 3 to Participant 2.

[The remaining part of the instruction is almost identical to the one for VCG.]

Player ID: _____
Player Type: Big or Small (circle one)
Computer #: _____

Review Questions:

(You will be **paid** the specified amount for each correct answer.)

Q.1 Number of packages. ($0.50)

a) ($0.25) What is the minimum number of packages you may receive in a single allocation?

b) ($0.25) What is the maximum number of packages you may receive in a single allocation?

Q.2 Translation and Conversion ($1)

Suppose the rankings submitted by a participant are as listed in the table below.

	Rank		
Package	Before translation	After translation	Points
{month1, month2}	10		
{month2, month3}	102		
{month3, month4}	7		
{month5, month6}	4		

a) ($0.5) Translate the submitted rank into consecutive numbers and fill in the column labelled "After translation" in the table above.

b) ($0.5) Convert the translated ranks into points and fill in the column labeled "Points" in the table above.

Q.3 Conversion ($0.5) Suppose a participant assigns a rank of 1 to two different packages. Choose one of the following situations that correctly describes the traslation and conversion process for those rankings.

a) Both of the packages get 1 pt.
b) Both of the packages get 66 pts.
c) One of the packages is randomly selected and given 66 pts, and the other gets 0 pts.
d) One of the packages is randomly selected and given 66 pts, and the other gets 65 pts.
e) One of the packages is randomly selected and given 132 pts, and the other gets 0 pts.

Your Answer ____

Please turn over

Q.4 Allocation ($1.5)

Suppose the rankings submitted by two participants are as listed in the table below. The following rankings have been submitted:

Participant	Package	Points
Participant 1	{month1, month2, month3}	66
	{month1, month2}	65
	{month1}	64
Participant 2	{month2, month3}	66
	{month1, month2}	65
	{month3}	64

The solver can choose to allocate the months in four different ways.

- Give {month1, month2, month3} to Participant 1. The total points are 66.
- Give {month1} to Participant 1 and {month3} to Participant 2. The total points are 64 + 64 = 128.
- Give $\{\quad\}$ to Participant 1
  and $\{\quad\}$ to Participant 2.
  The total points are $\{\quad\}+\{\quad\}=\{\quad\}$.
- Give $\{\quad\}$ to Participant 1
  and $\{\quad\}$ to Participant 2.
  The total points are $\{\quad\}+\{\quad\}=\{\quad\}$.

a) ($0.5) Find the other two ways of allocation (in any order) and fill in the blank spaces above.

b) ($0.5) Compute the total points for each of the two allocations and fill in the blank spaces above.

c) ($0.5) Find the allocation that maximizes the total points and fill in the blank space below.
Participant 1 gets $\{\quad\}$ and
Participant 2 gets $\{\quad\}$.

3 Experiment Instruction for RAD

Player ID: _____
Player Type: _____
Computer #: _____

Instruction

[The same as above]

Overview

[The same as above]

Background

[The same as above]

Value Determination

[The same as above]

Auction Process

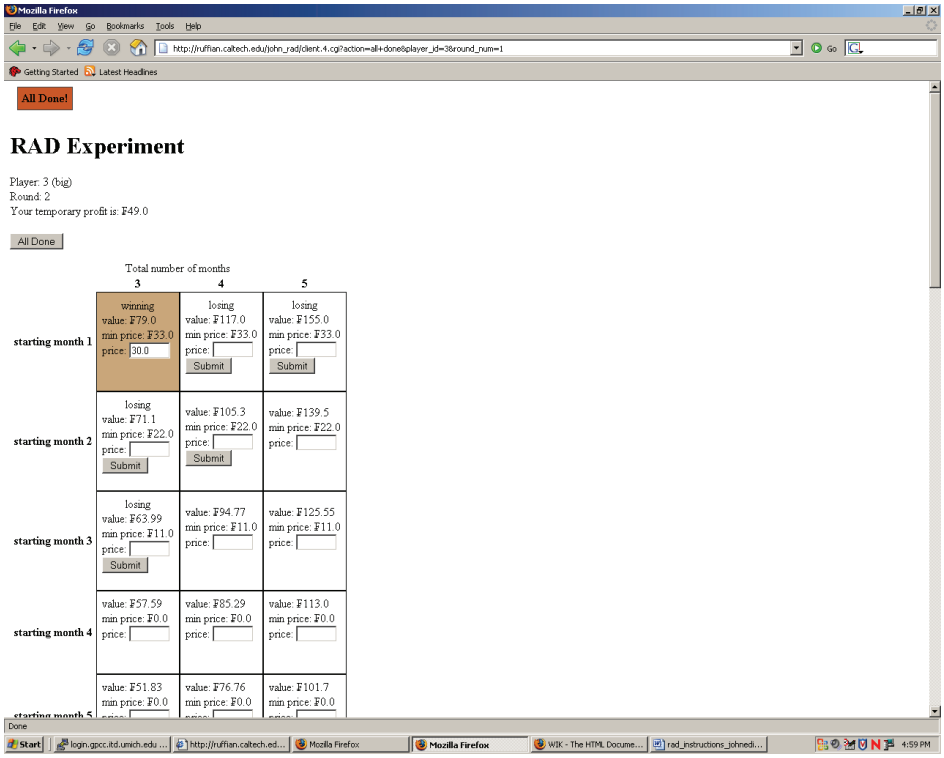
[The same as above]

Submitting an Order

The packages will be presented to you in a table format. The different rows will represent different starting months, and the different columns will represent different durations. For example, to find a package that starts on the 4th month, and lasts for 3 months, you will first look for the row that is labeled 4, and find the column that is labeled 3.
In each cell, you will see the value of that package to you. If you wish to bid on that package, you can submit a price in the textbox and then click on the submit button. Note that you will need to click the submit button for each time that you submit a bid. Refer to Figure 1 below to see how your screen will look during the submission process.
If your submitted price is lower than the minimum price, your bid will not be accepted. You are allowed to submit a price for a package that is higher than your value for that package, but if you end up winning the package, you will be making a negative profit. **If you earn a negative profit for an auction, that amount will be deducted from your experiment pay. If your cumulative earning becomes negative, that is if the sum of your**

show up fee, quiz score, and profit from participating in the experiment is negative, you will be asked to leave the experiment.

Figure 3: Submission Sample



Canceling an Order

[The same as above]

All Done Button

[The same as above]

Beginning of Next Round

Once all the players have submitted the bids for a round and clicked on "All Done", the computer will determine, for each of the submitted bids, if it was winning or losing. The word "winning" or "losing" will appear in the corresponding cells.

Eligibility

To encourage active bidding there is a "use it or lose it" rule. In the first round, you can bid for any and all packages. In each subsequent round, you will be allowed to bid only on as many months you have placed bids on in the previous round. The maximum

number of months you are allowed to have in all of your bids in a round is called your eligibility. Thus, your eligibility at the beginning of the auction is all the months that you can bid on, which is 24.

Example: Suppose that in the first round a bidder makes three bids. These are for:

Bid 1: A package beginning in month 3 and lasting for three months
Bid 2: A package beginning in month 4 and lasting for four months
Bid 3: A package beginning in month 13 and lasting for four months

The months that the bidder has placed bids on are:

Bid 1: month 3, month 4, month 5
Bid 2: month 4, month 5, month 6, month 7
Bid 3: month 13, month 14, month 15, month16

Therefore, the unique months that the bidder has placed bids on are: month 3, month 4, month 5, month 6, month 7, month 13, month 14, month 15, and month 16. This makes a total of nine distinct months. Therefore, the bidder will have an eligibility of 9 in the next round; she will be able to place bids on 9 distinct months.

Note that the eligibility will be computed on your behalf at the start of each round from the bids that you submitted in the previous round. If you are eligible to place a bid on a package, the Submit button will be available to you. The Submit button for a package will not be available to you if placing that package will result in you exceeding your eligibility.

Note that the submission of one bid may affect your eligibility for other bids in the same round.

The Solver

At the end of each round the solver will determine which bids are the temporary winning bids. The solver selects the combination of bids that maximizes the revenue to be received. For simplicity, in all subsequent examples, we assume that there are only three months, and the minimum package is one month.

Example: :

At the end of round 1, the following bids have been submitted:

Bidder 1: month 1, month 2, month 3 = 200
Bidder 2: month 1 = 100
Bidder 3: month 2, month 3 = 75

The solver can choose to allocate the months in two different ways.

1. Give month 1, month 2, and month 3 to Bidder 1. The total revenue is 200.
2. Give month 1 to Bidder 2 and month 2 and month 3 to Bidder 3. The total revenue is 175.

Since the first allocation gives a higher total revenue, the solver will make Bidder 1 the temporary winning bidder of month 1, month 2, and month 3.

If you have a temporary winning bid at the end of a round, that bid will automatically be resubmitted. You may not withdraw a temporary winning bid.

The Calculation of Prices

While the computer is calculating the temporary winning bids, it will also compute prices for each month. In turn, these prices will determine the minimum prices of the packages in the next round. This process takes place in two steps.

First, the computer will first try to calculate prices, one for each month, so they sum up to the temporary winning bids and are greater than any losing bids whenever possible. When this is not possible, the computer will find prices that come as close as possible to meeting the rules. So it is possible that you will have a bid that exceeds the minimum price and yet is not a winning bid.

In the following two examples, a * in front of a bid indicates that it is a temporary winning bid.

Example: 1:

*Bidder 1: month 1 = 30
*Bidder 2: month 2 = 10
*Bidder 3: month 3 = 21

Month 1: price 30
Month 2: price 10
Month 3: price 21

Example: 2:

Bidder 1: month1, month 2 = 30
Bidder 2: month 3 = 8
*Bidder 3: month 1, month 2, month 3 = 39

Month 1: price 15
Month 2: price 15
Month 3: price 9

The temporary winning bid is bidder number 3's bid for month1, month 2, and month 3. Choosing it yields the highest revenue. The computer will calculate prices such that:

1. The prices for month 1, month 2, and month 3 add up to 39
2. The prices for month 1 and month 2 add up to at least 30
3. A price for month 3 that is at least 8

If there are several possible solutions then the computer will try to equalize the prices.

Next, after the solver has computed the prices, it sets the minimum prices for the next round by increasing the computed prices by 10%. So, following the result of Example 1, the minimum prices that would be displayed in the next round would be:

Month 1: minimum price 33
Month 2: minimum price 11
Month 3: minimum price 23.1

In the next round, Bidder 1's temporary winning bid of 30 for month 1 will be resubmitted at that price. However, the minimum price for anyone else who wishes to bid on this package will be 33.

Minimum Bids

At the start of each round, a price for each package will be displayed by the computer. Your bid for any package must be greater than or equal to the minimum price posted.

Timing

For each auction, you will be given up to four minutes to submit your bids in the first round. In rounds 2-9 of that auction, you will be given two minutes to submit your bids. In rounds 10 and higher, you will be given one minute. An experimenter will alert you when your time for each round is up and will ask you to click the "All Done" button if you have not already.

Auction Results

At the end of each auction (not the end of each round), please record your winning package, if any, the value you have for that package, the price you paid for the package, and your profit (value – paid price).

Stopping the Auction

Each auction will consist of a series of rounds. The auction will be closed at the end of round T if there is no change in the temporary ownership between the end of round T-1 and the end of round T.

Special Notes

We do not offer any guarantees that the software will not crash. When the computer crashes there may be some excitement, but there is no need to panic.

Worksheet

Please fill out the worksheet completely as instructed. Your values are private information. Please do not reveal them to anyone.

At the end of the auction the owner of each package will receive his or her profit. Again, this is calculated in the following way:

$$\textbf{Profit} = \textbf{value} - \textbf{final price}.$$

Player ID: _____
Player Type: Big or Small (circle one)
Computer #: _____

Review Questions:

(You will be **paid** the specified amount for each correct answer.)

Q.1 Number of temporary winning bids and winning bids. ($1)

a) ($0.25) What is the minimum number of **temporary winning bids** you may have at the **beginning** of a round?
b) ($0.25) What is the maximum number of **temporary winning bids** you may have at the **beginning** of a round?
c) ($0.25) What is the minimum number of **winning bids** you may have at the **end** of the auction?
d) ($0.25) What is the maximum number of **winning bids** you may have at the **end** of the auction?

For questions 2 and 3, refer to the Figure 1: Submission Sample on page 3 of the instruction.

Q.2 ($1)

a) ($0.25) Which package is the temporary winning package for player 3?
b) ($0.25) What is the value of the temporary winning package for player 3?
c) ($0.25) What is the price player 3 is paying for this package?
d) ($0.25) What is the temporary profit for player 3? (Hint: Profit = Value - Price)

Q.3 ($1) For the package that starts on month 2 and lasts for 3 months:

a) ($0.25) Is it possible to submit a price of ₣10?
b) ($0.25) Is it possible to submit a price of ₣25?
c) ($0.25) Is it possible to submit a price of ₣100?
d) ($0.25) If player 3 submits a price of ₣80, and this package becomes the temporary winning bid in round 3, what would be the temporary profit?

For questions 4 and 5, refer to this table.

	Package	Bid
Bidder 1	1–2	₣50
Bidder 2	1–2	₣20
Bidder 3	1–4	₣60
Bidder 4	3–5	₣50

Q.4 Winning Bids ($1) Suppose the bids submitted by four bidders are as listed in the table above. Which set of bids will be marked temporarily winning in Round 2?

Q.5 Eligibility ($1) What is the eligibility for each bidder at the beginning of Round 2?

($0.25) Bidder 1:
($0.25) Bidder 2:
($0.25) Bidder 3:
($0.25) Bidder 4:

4 Demographics and Strategy Surveys

Player ID: _____
Player Type: Big or Small (circle one)
Computer #: _____

Earning Work Sheet:

Allocation #	Package Received (starting month, package length)	Value
Example	(2,3)	100
Allocation 1		
Allocation 2		
Allocation 3		
Allocation 4		
Allocation 5		
Allocation 6		
Allocation 7		
Allocation 8		
Total	Total Profit=	

(_____ / _____) + _____ + _____ = _____
Total Profit Exchange Rate Quiz Score Show Up Fee Total Earning

Player ID: _____
Player Type: Big or Small (circle one)
Computer #: _____

Demographics Information

Age: _____

Gender: _____

Major: _____

Undergrad:
First Year, Second Year, Third Year, Fourth Year, Fifth Year, Six or more
Or
Grad:
First Year, Second Year, Third Year, Fourth Year, Fifth Year, Six or more

Number of Game Theory Classes Taken:_____

Have you discussed auction strategy in any of your courses? Yes or No.
If so, which courses?

Player ID: _____ Computer #: _____

Strategy (record the strategy you used here and on the back):

1. How did you decide which packages to submit a rank for?

2. How did you decide how to rank the packages?

3. Did you consider the valuation of others in determining your rankings?

4. Did you consider your type (big or small) and whether you preferred early or late months in determining your rankings?

5. Additional Comments