

ASSIGNMENT 3

Answer key

Question 1 (7 points)

Goldmines is a (fictitious) company on the Toronto Stock exchange, and at 1:00PM the contents of its limit order book are 100 buy orders at \$85; 50 buy orders at \$70; 30 sell orders at \$105 and 40 sell orders at \$110. Then the electronic “ticker tape” shows that at:

1:05PM	Buy orders for 20 at \$95.00 submitted.
1:10PM	Sell orders for 100 at \$100.00 submitted.
1:12PM	Market sell orders for 10 at \$95.00 submitted.
1:15PM	Buy orders for 50 at \$85.00 withdrawn.
1:20PM	Market sell orders for 10 at \$95.00.
1:40PM	Sell orders for 20 at \$110.00 withdrawn.
1:50PM	Buy orders for 40 at up to \$110.00 submitted.

At 2:00PM Goldmines announces a major discovery doubling the size of its reserves, a complaint is registered with the Canadian SEC, and trading in Goldmines is temporarily suspended:

- Graphically show what the limit order book looks like at 2:00PM.

1:00PM

SELL	BUY
30x\$105	100x\$85
40x\$110	50x\$70

1:05PM

SELL	BUY
30x\$105	20x\$95
40x\$110	100x\$85
	50x\$70

1:10 PM

SELL	BUY
40x\$110	20x\$95
30x\$105	100x\$85
100x\$100	50x\$70

1:12 PM

SELL	BUY
40x\$110	20x\$95
30x\$105	100x\$85
100x\$100	50x\$70
10x\$95	

1:15 PM

SELL	BUY
40x\$110	10x\$95
30x\$105	100x\$85
100x\$100	50x\$70

1:20 PM

SELL	BUY
40x\$110	10x\$95
30x\$105	50x\$85
100x\$100	50x\$70
10x\$95	

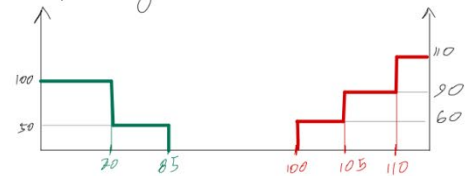
1:40 PM

SELL	BUY
30x\$110	50x\$85
30x\$105	50x\$70
100x\$100	

1:50 PM

SELL	BUY
20x\$110	40x\$110
30x\$105	50x\$85
100x\$100	50x\$70

Graphically, at 2:00 PM



b. Graphically show how the bid ask spread evolved from 1:00PM until 2:00PM.

1:00PM
 SELL BUY
 30x\$105 100x\$85
 40x\$110 50x\$70
 SPREAD = 105 - 85 = 20

1:05PM
 SELL BUY
 30x\$105 20x\$95
 40x\$110 100x\$85
 50x\$70
 SPREAD = 105 - 95 = 10

1:10 PM
 SELL BUY
 40x\$110 20x\$95
 30x\$105 100x\$85
 100x\$100 50x\$70
 SPREAD = 100 - 95 = 5

1:12 PM
 SELL BUY
 40x\$110 ~~20x\$95~~
 30x\$105 100x\$85
 100x\$100 50x\$70
~~10x\$95~~
 SALE HAPPENS ⇒ SPREAD 0
 SPREAD = 100 - 95 = 5

1:15 PM
 SELL BUY
 40x\$110 10x\$95
 30x\$105 100x\$85
 100x\$100 50x\$70
 SPREAD = 100 - 95 = 5

1:20 PM
 SELL BUY
 40x\$110 ~~10x\$95~~
 30x\$105 50x\$85
 100x\$100 50x\$70
~~10x\$95~~
 SPREAD 0,
 SPREAD = 100 - 85 = 15

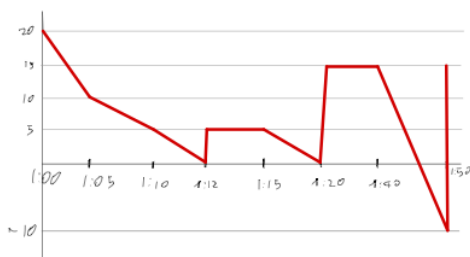
1:40 PM
 SELL BUY
~~30x\$110~~ 50x\$85
 30x\$105 50x\$70
 100x\$100
 SPREAD = 100 - 85 = 15

1:50 PM
 SELL BUY
 20x\$110 ~~40x\$110~~
 30x\$105 50x\$85
 100x\$100 50x\$70
 60
 SPREAD = 10
 SPREAD = 100 - 85 = 15

Graphically



Alternatively, if you want to consider sales as spread 0



- c. What was the volume of transactions between 1:00PM and 2:00PM and at what price did each transaction occur?

First transaction: 1:12PM, volume 10 price 95

Second transaction: 1:20PM volume 10 price 95

Third transaction: 1:50PM, volume 40, price 100

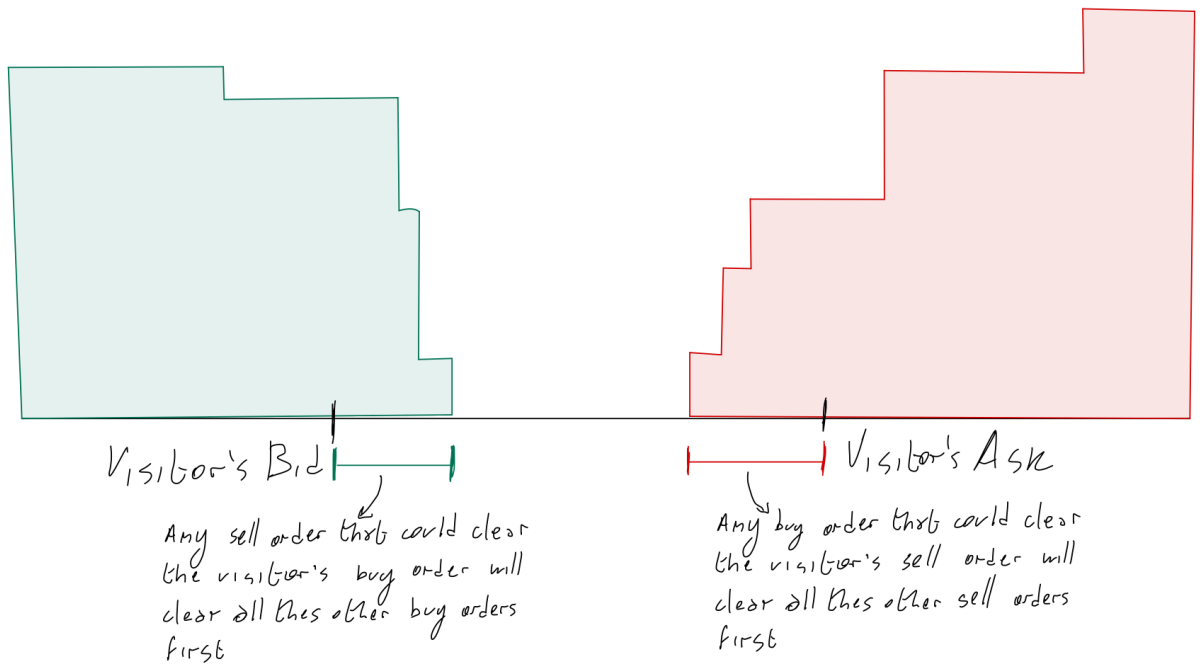
- d. Why might trading have been suspended?

The last transaction was four times the volume of the previous ones and occurred with a very large buy price, just before the revelation of information that is very likely to increase the value of the firm's shares. This could be indicative of insider trading.

Question 2 (8 points)

On a tour of the NYSE a visitor complains to a specialist that he never executes his orders, and the specialist responds that the limit buy orders of the visitor are too low and his limit sell orders are too high:

a. Using illustrations, demonstrate the argument that the specialist is making.



b. Suppose the specialist is front running. Show how the visitor would have gained from trading and the specialist was (illegally) able to expropriate those gains from visitor.

<p>10:00 AM BUY SELL 100x\$50 100x\$100</p>	<p>10:01 AM BUY SELL 100x\$50 100x\$100 (50x\$60) <small>Submitted by visitor; specialist does not enter it in the book</small></p>	<p>10:02 AM BUY SELL 50x\$80 100x\$100 100x\$50 (50x\$60) <small>Submitted by visitor; specialist does not enter it in the book</small></p>	<p>10:03 AM BUY SELL 50x\$80 100x\$100 100x\$50 50x\$80 <small>Specialist's market order fills limit buy order</small> (50x\$60) <small>Submitted by visitor; specialist does not enter it in the book</small></p>
<p>10:04 AM BUY SELL 100x\$50 100x\$100 50x\$60 <small>Finally specialist enters visitor's order in book</small> <small>specialist lies and says he received visitor's order at 10:02</small></p>	<p>10:05 AM BUY SELL 50x\$60 <small>specialist submits market buy and fills visitor's order</small> 100x\$50 100x\$100 50x\$60</p>	<p><small>specialist pockets 50x\$80-60 profit that the visitor should have made</small></p>	

- c. Supposing front running were legalized, how would the specialist set prices? To answer this question, suppose there is an upward sloping supply curve for securities, a downward sloping demand curve for them. Suppose the intersection is the market price and quantity. Now show what happens if the specialist drives a wedge between the price seller gets and the price the buyer pays. Use diagrams if they are helpful.

When buy/sell orders could cross, the specialist would separately fulfill the buy order at (or slightly lower than) the bid price, and the sell order at (or slightly higher than) the ask price.

In a standard supply–demand diagram, the competitive equilibrium occurs at the intersection P^*, Q^* . A specialist would instead buy from sellers at a lower price $P_s < P^*$ and sell to buyers at a higher price $P_b > P^*$. This creates a bid–ask spread $P_b - P_s$. The quantity traded becomes the level where sellers are willing to supply at P_s and buyers are willing to buy at P_b , which is less than the competitive quantity Q^* . The specialist captures much of the gains from trade as profit, while buyers and sellers receive less surplus and the market experiences deadweight loss.



- d. Using your answer to the previous part, explain what would happen if the rules against front running were not fully enforced. Is there are going to be more trade or less?

The specialist would extract most of the gains from trade, which would make the clients face higher bid-ask spreads and benefit less from trade. In the worst-case scenario where the specialist extracts all the gains from trade, the client would have no incentive to participate in the market, resulting in market failure.

