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ECON 102 McLeod – Exam 2 – Practice Exam Solutions

1. A – 0.5

$$MC \text{ in short run} = \frac{W}{MP_L}$$

$$\$24 = \frac{\$12}{MP_L}$$

$$MP_L = 0.5$$

2. D – \$560

$$MC_4 = TC_4 - TC_3$$

$$MC_4 = \$800 - \$240$$

$$MC_4 = \$560$$

3. A – \$80

$$ATC_3 = TC_3 / 3$$

$$ATC_3 = \$240 / 3$$

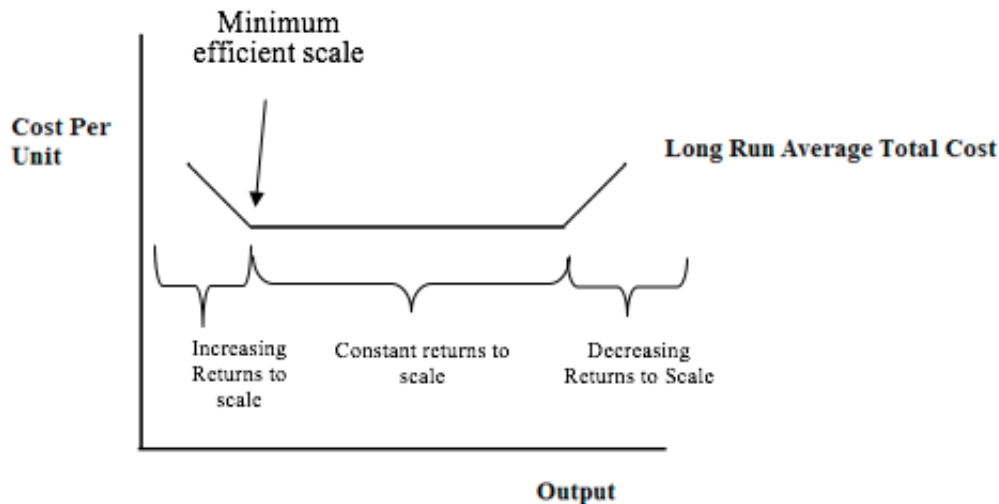
$$ATC_3 = \$80$$

4. C – When diminishing marginal product begins

5. B –  $AVC > 0$  and  $ATC > AFC$ . We know  $AVC$  will be greater than \$0 whenever we are producing more than 0 units.  $ATC = AVC + AFC$ . If  $AVC > 0$ , then  $ATC > AFC$ .

6. C – A period of time where at least one input is fixed

7. B – Increasing returns to scale, decreasing. We know we are experiencing increasing returns to scale because the butcher shop doubled its inputs and more than doubled its output. Total cost will be decreasing in the increasing returns to scale section of the LRAC.



8. E – The firm is able to increase profit by producing one unit less

In perfect comp,  $P = MR$

So, we know that at the current level of production  $MR < MC$

The firm will want to decrease the number of units it is producing until it reaches the point where  $MR = MC$ . Decreasing production by one unit will increase profit as long as  $MR < MC$ . The firm will want to continue decreasing production until  $MR = MC$ ; however, reducing production by even one unit will increase profit.

9. C – Firms will exit the market, and the market price will increase. Firms are earning negative economic profit because  $P < ATC$ ; however, the firms are earning enough to continue to operate in the short run because  $P > AVC$ . The negative economic profit will cause firms to exit the market over the long run. The market price will increase as firms exit the market. Eventually the market will reach the point where  $P = ATC$  when it reaches long run equilibrium and firms are earning zero economic profit.
10. B – Sellers in perfect competition are price takers so they have no control over the market price. All firms sell at the market price so it is not possible for firms to sell at different prices. If a firm tries to charge a price above the market price, no one will be willing to purchase from that firm since there are many other firms selling the good at the market price. Firms can sell as much as they want at the market price so there is no incentive for firms to lower their price below the market price.
11. C – Total product increases because we get 10 additional units from one more unit of labor. APL decreases because 10 is less than 12 so it will bring the average down.

12. D – Total product increases because we get 14 additional units from one more unit of labor. APL increases because 14 is greater than 8 so it will bring the average up.

13. B – Total variable cost divided by output

14. A – \$300

$$AVC_4 = \$1,200 / 4$$

$$AVC_4 = \$300$$

15. E – Both C and D. When output is zero total cost and total fixed cost will always be equal because there will be no variable cost when output is zero.

16. C – Strategic dependence. The actions of one firm, will directly impact the actions of the other firms in the market.

17. B – \$30

$$MR_5 = TR_5 - TR_4$$

$$TR_4 = \$80 \times 4 = \$320$$

$$TR_5 = \$70 \times 5 = \$350$$

$$MR_5 = \$350 - \$320$$

$$MR_5 = \$30$$

18. B – A strategy that always produces a better outcome than the alternatives

19. C – \$45

$$MR = p \left( 1 - \frac{1}{|E|} \right)$$

$$MR = \$60 \left( 1 - \frac{1}{|-4|} \right) = \$45$$

20. B – The difference between the amount an individual is willing to pay for a good and what the individual actually has to pay for the good.

21. B – Price matching is bad for consumers because it keeps prices high. See the example in the review packet for an in-depth explanation.

### Short Answer

1. 56

$$MPL_4 = Q_4 - Q_3$$

$$MPL_4 = 156 - 100$$

$$MPL_4 = 56$$

2. The 6<sup>th</sup> worker

To solve this problem, we need to find the MPL for each worker. Then we look for the point where MPL begins to decline.

Units of Labor	Output	MPL
0	0	-
1	20	20
2	52	32
3	100	48
4	156	56
5	220	64
<b>6</b>	<b>264</b>	<b>44</b>
7	292	28
8	304	12

3. The first step is to make a complete table where you find the values for TC, MC, and AVC using the information provided in the problem. You can also find ATC and AFC, but you don't actually need ATC and AFC to solve the problem.

Output	VC	FC	TC	MC	AVC	ATC	AFC
0	\$0	\$90	\$90	-	-	-	-
1	\$210	\$90	\$300	\$210	\$210	\$300	\$90
2	\$360	\$90	\$450	\$150	\$180	\$225	\$45
3	\$450	\$90	\$540	\$90	\$150	\$180	\$30
4	\$630	\$90	\$720	\$180	\$158	\$180	\$23
5	\$840	\$90	\$930	\$210	\$168	\$186	\$18
6	\$1,170	\$90	\$1,260	\$330	\$195	\$210	\$15

We are dealing with a perfectly competitive firm so we know that the market price is also the marginal revenue for the firm. The firm wants to produce at the point where  $MR = MC$ . If we don't have a point where  $MR = MC$ , we want to produce as many units as possible without letting  $MR$  fall below  $MC$ .

The first step is to determine the profit maximizing level of output for each price. Then we need to make sure the price is greater than  $AVC$  at that level of output. If  $AVC$  is greater than the price at the profit maximizing level of output, the firm should shut down and produce 0 units.

At a price of \$95, the profit maximizing level of output would be 3 units. However,  $AVC$  for producing 3 units is \$150, which is greater than the price of \$95. So, the firm should produce 0 units, and its total cost will be equal to its fixed costs. A firm's losses will never be less than total fixed costs because the firm can always shut down and only incur the fixed costs.

At each of the other price points, price will be greater than  $AVC$  at the profit maximizing level of output. In this case, we find total revenue by multiplying price by the number of units produced. We then take the difference between total revenue and total cost to find profit.

Market Price	Profit maximizing level of output	Total Revenue	Total Cost	Profit
\$95	0	\$0	\$90	-\$90
\$168	3	\$504	\$540	-\$36
\$186	4	\$744	\$720	\$24
\$225	5	\$1,125	\$930	\$195
\$255	5	\$1,275	\$930	\$345

4. 1) Price must be greater than AVC. If price is less than AVC, the firm will shut down and produce 0 units. The minimum point of the AVC curve is referred to as the shutdown price for a firm.

2) The marginal cost curve needs to be at the point where it is increasing.

5. 56

We need to set  $MR = MC$ . To find MR, we need to double the slope of the demand equation.

$$P = 6,000 - 50Q$$

$$MR = 6,000 - (2)50Q$$

$$MR = 6,000 - 100Q$$

$$MC = \$400$$

$$MR = MC$$

$$6,000 - 100Q = 400$$

$$5600 = 100Q$$

$$Q = 56$$

6. \$3,200

$$P = 6,000 - 50Q$$

$$P = 6,000 - 50(56)$$

$$P = 3,200$$

7. \$156,800

$$\text{Profit} = (\text{Price} - \text{MC})(Q) - \text{FC}$$

$$\text{Profit} = (\$3,200 - \$400)(56) - \$0$$

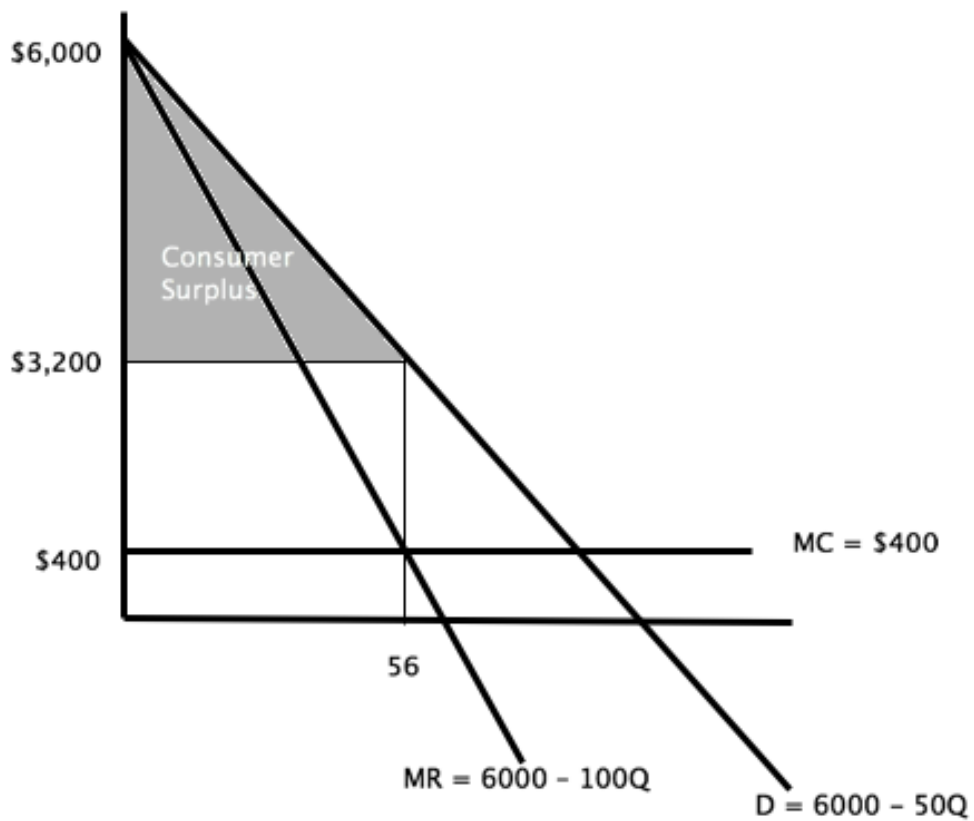
$$\text{Profit} = \$156,800$$

8. 78,400

CS is the area below the demand curve but above the equilibrium price.

$$\text{CS} = (1/2)(56)(6,000 - 3,200)$$

$$\text{CS} = 78,400$$



9. \$400. In a perfectly competitive market,  $P = MC$ .

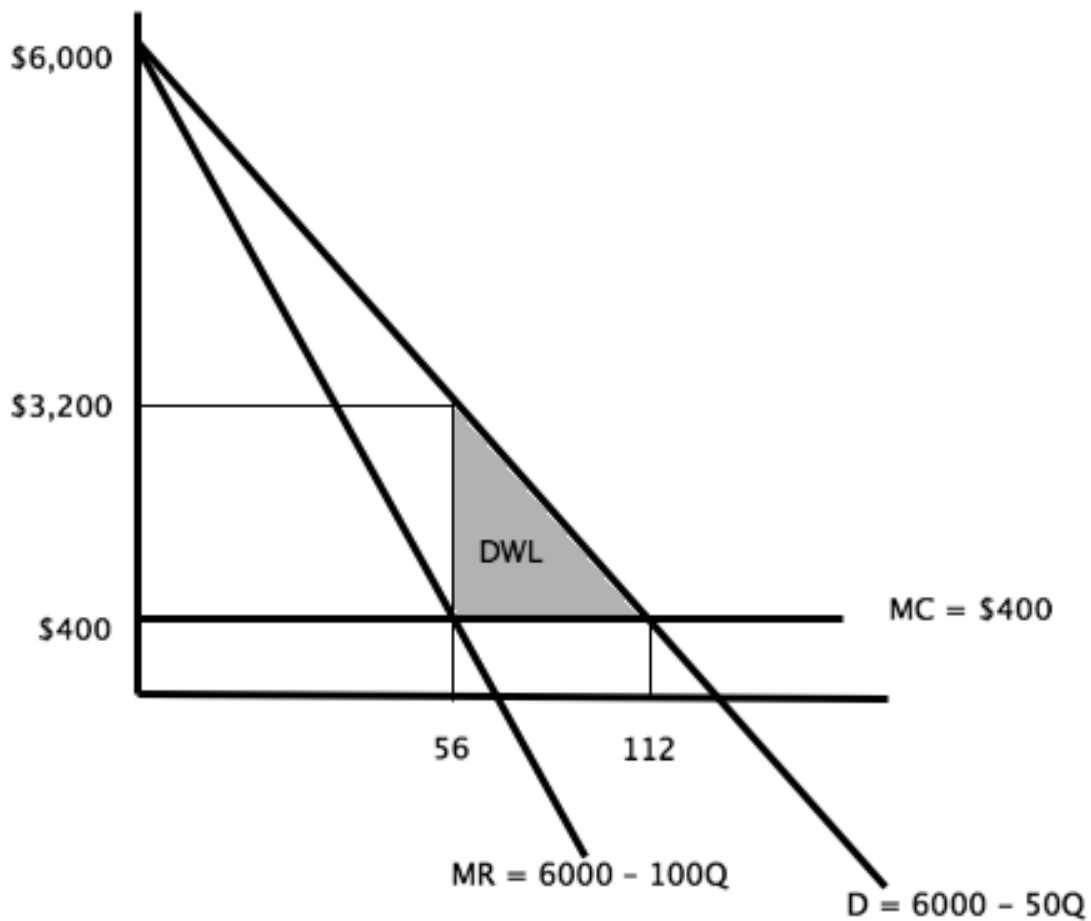
10. 112

$$\begin{aligned} P &= MC \\ 6,000 - 50Q &= 400 \\ 5,600 &= 50Q \\ Q &= 112 \end{aligned}$$

11. 78,400

DWL is the area where we have producer or consumer surplus under perfect competition; however, we have neither producer or consumer surplus under monopoly.

$$\begin{aligned} DWL &= (1/2)(112 - 56)(3200 - 400) \\ DWL &= 78,400 \end{aligned}$$





12. (1) **The firm must face a downward sloping demand curve** – The firm must have enough market power to change the price of its goods and services

(2) **The firm must be able to easily and cheaply identify buyers or groups of buyers with predictably different elasticities of demand** – Different consumers must have different valuations of the product

(3) **It must be difficult to resell the good** – There needs to be a way to prevent consumers buying the good at the low price from reselling the good to the high price customers

13. No

What will Firm #1 do if Firm #2 chooses left? Select bottom because  $20 > 16$ .

		Firm #2	
		Left	Right
Firm #1	Top	16 28	
	Bottom	20 16	

What will Firm #1 do if Firm #2 chooses right? Select top because  $32 > 28$ .

		Firm #2	
		Left	Right
Firm #1	Top		32 36
	Bottom		28 24

Firm #1 does not have a dominant strategy. Firm #1 will go bottom if Firm #2 goes left; however, Firm #1 will go top if Firm #2 goes right.

14. Yes, Right

What will Firm #2 do if Firm #1 chooses top? Select right because  $36 > 28$ .

		Firm #2			
		Left		Right	
Firm #1	Top	16	28	32	36
	Bottom				

What will Firm #2 do if Firm #1 chooses bottom? Select right because  $24 > 16$ .

		Firm #2			
		Left		Right	
Firm #1	Top				
	Bottom	20	16	28	24

Firm #2 has a dominate strategy to select right. Firm #2 will choose right when Firm #1 chooses top or bottom.

15. Top-Right

		Firm #2			
		Left		Right	
Firm #1	Top	16	28	32	36
	Bottom	20	16	28	24

16. Bottom-Right

**Firm #1 Lowest Payoffs**

Lowest Payoff Top = 16

		Firm #2	
		Left	Right
Firm #1	Top	16 28	32 36
	Bottom	[Redacted]	

Lowest Payoff Bottom = 20

		Firm #2	
		Left	Right
Firm #1	Top	[Redacted]	
	Bottom	20 16	28 24

Firm #1 will select **bottom** because  $20 > 16$

**Firm #2 Lowest Payoffs**

Lowest Payoff Left = 16

		Firm #2	
		Left	Right
Firm #1	Top	16 28	
	Bottom	20 16	

Lowest Payoff Right = 24

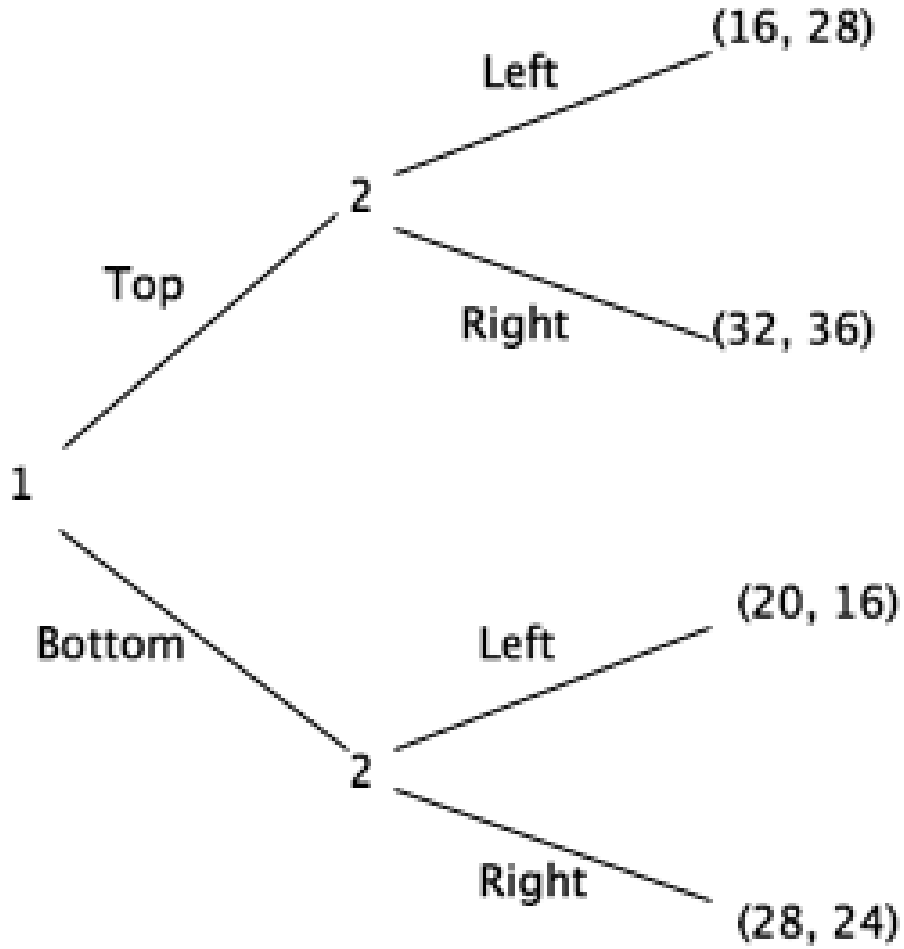
		Firm #2	
		Left	Right
Firm #1	Top		32 36
	Bottom		28 24

Firm #2 will select **right** because  $24 > 16$

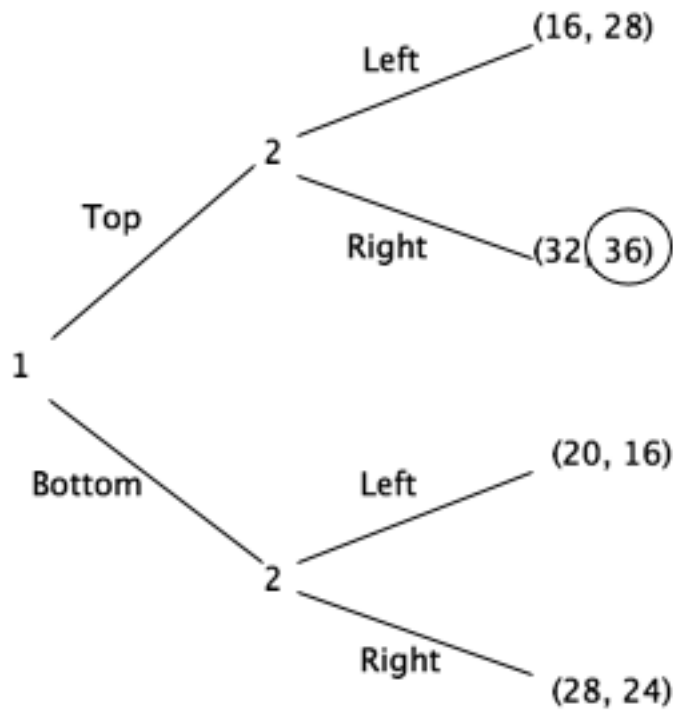
**Result will be Bottom-Right because Firm #1 will select bottom and Firm #2 will select right –** See the example in the review packet for a more detailed explanation of the maximin strategy. Always keep in mind that maximin is completely different from how we approach normal game theory problems.

17. Top-Right

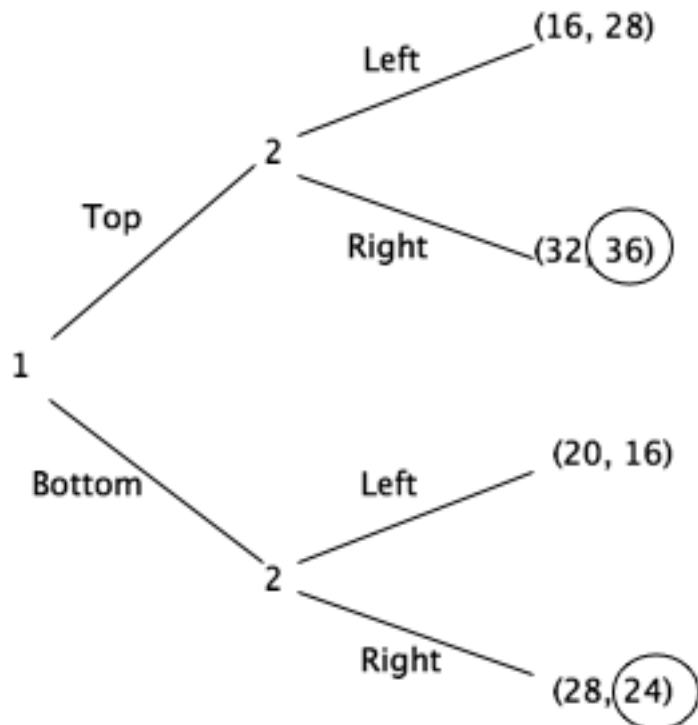
First, you need to turn the table into a decision tree where Firm #1 goes first.



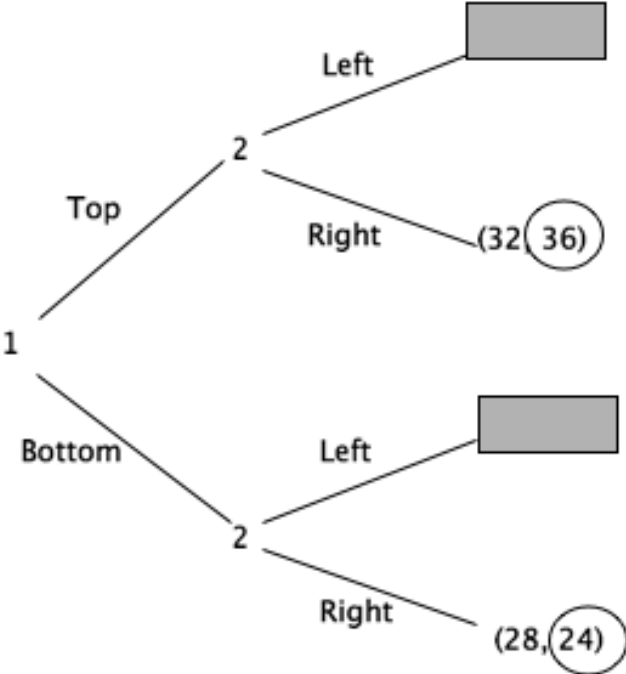
What will Firm #2 do if Firm #1 selects top? Firm #2 will select right because  $36 > 28$ .



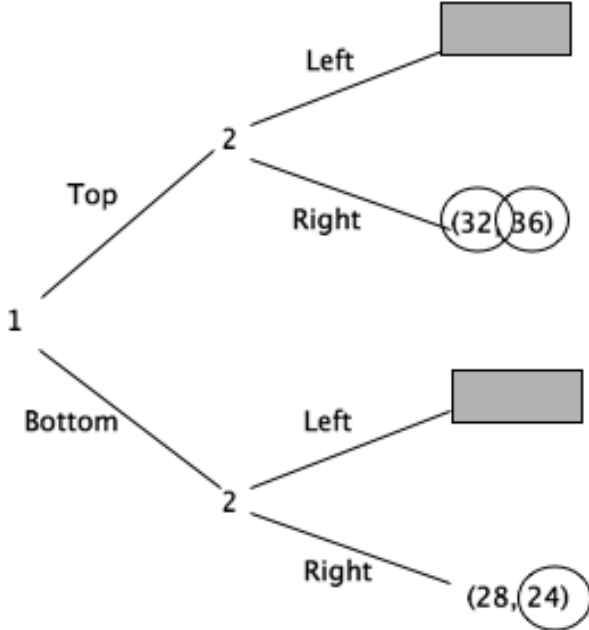
What will Firm #2 do if Firm #1 select bottom? Firm #2 will select right because  $24 > 16$ .



**Firm #1 knows that Firm #2 will always select right** – This means that top-left and bottom-left are not possible options for Firm #1.



**Firm #1 will select top because  $32 > 28$**  – Firm #1 selects the highest payoff based on the knowledge that top-left and bottom-left are not possible outcomes.



18. \$9,750

$$P = \$15$$

$$Q_d = 800 - 10(\$15) = 650$$

$$TR = \$15 * 650 = \$9,750$$

19. -0.119 (inelastic)

$$Q_1 = 800 - 10(\$8) = 720$$

$$Q_2 = 800 - 10(\$9) = 710$$

$$E_P = \frac{Q_{d2} - Q_{d1}}{(Q_{d1} + Q_{d2})/2} \div \frac{P_2 - P_1}{(P_1 + P_2)/2} = \frac{710 - 720}{(720 + 710)/2} \div \frac{\$9 - \$8}{(\$8 + \$9)/2} = \frac{-10}{715} \div \frac{\$1}{\$8.50} = -0.119$$

Alternatively...

$$E_P = \frac{Q_{d2} - Q_{d1}}{Q_{d1} + Q_{d2}} \div \frac{P_2 - P_1}{P_1 + P_2} = \frac{710 - 720}{720 + 710} \div \frac{\$9 - \$8}{\$8 + \$9} = \frac{-10}{1,430} \div \frac{\$1}{\$17} = -0.119$$

Note that both versions of the midpoint formula will give you the same answer. Use whichever form the equation you find easiest to remember.

20. -2.2 (elastic)

$$P = \$55$$

$$Q_d = 800 - 10(\$55) = 250$$

**Point elasticity = Coefficient for P \* (P / Q)**

$$E = -10 * (P / Q)$$

$$E = -10 * (\$55 / 250)$$

$$E = -2.2$$

21. Demand is elastic so the firm will need to decrease price to increase revenue.

22. \$40

A firm's revenue is maximized when its elasticity is unit elastic (-1). We will use -1 as the value for elasticity, and we will need to substitute the demand function in for  $Q_d$  so we only have one variable in our equation. Then we do algebra and solve for P.



**Coefficient for P \* (P / Q) = Point elasticity**

$$-10 * (P / Q) = -1$$

$$-10 * (P / (800 - 10P)) = -1$$

$$-10P / (800 - 10P) = -1$$

$$-10P = -800 + 10P$$

$$800 = 20P$$

$$P = \$40$$