Intro to Economic Analysis: Microeconomics

EC 201 - Day 15 Slides

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15 November 2021

Logistics

- Homework 6 due this Saturday at 11:59pm, homework 7-8 can be flexible (up to discussion, posted date is final)
- I will post final news assignments soon, the final news assignment is due next Wednesday (Nov 24) at 11:59pm
- Midterm discussion at end of class

Positive Consumption Externality

- Recall the Vegan Food Example

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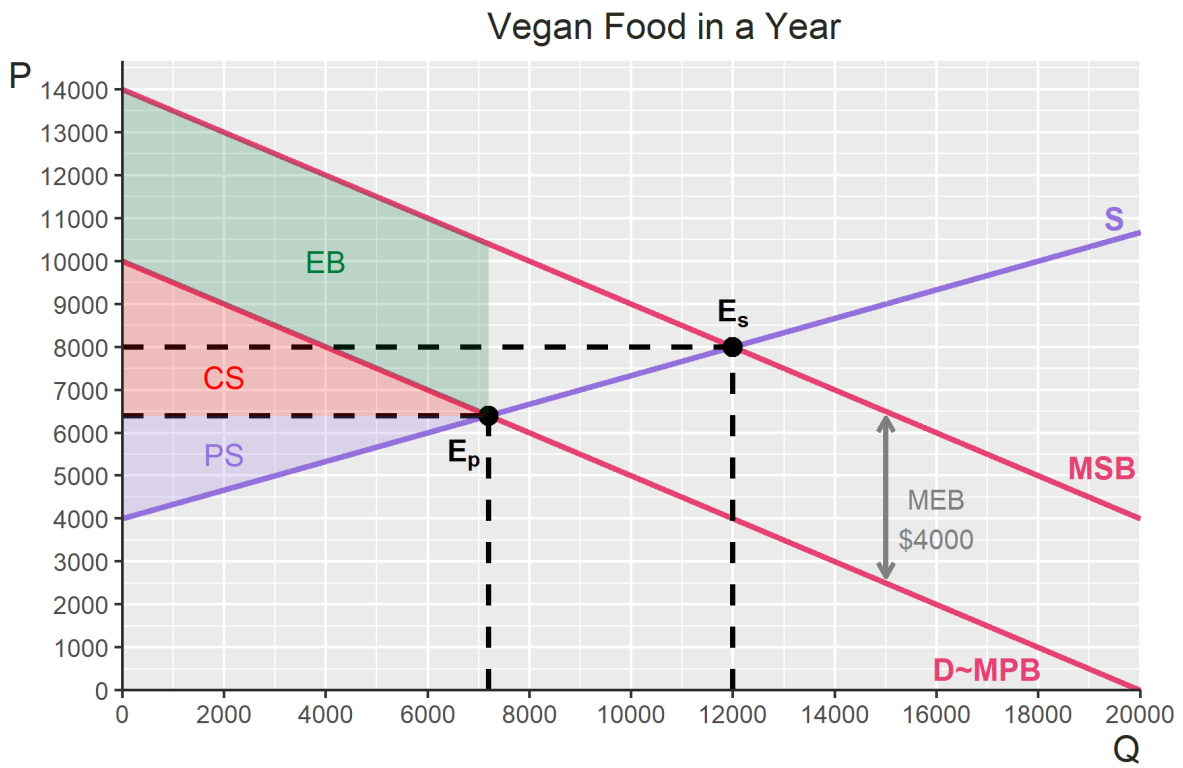
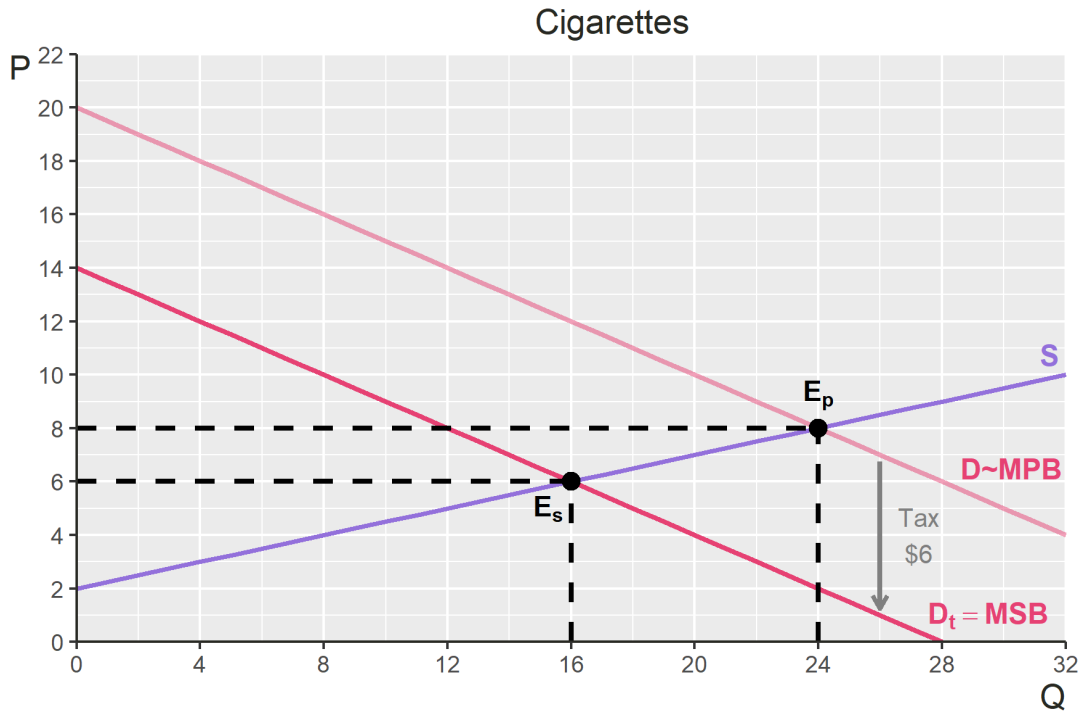
- Here is the CS, PS, and EB (i.e., TS) before the subsidy:



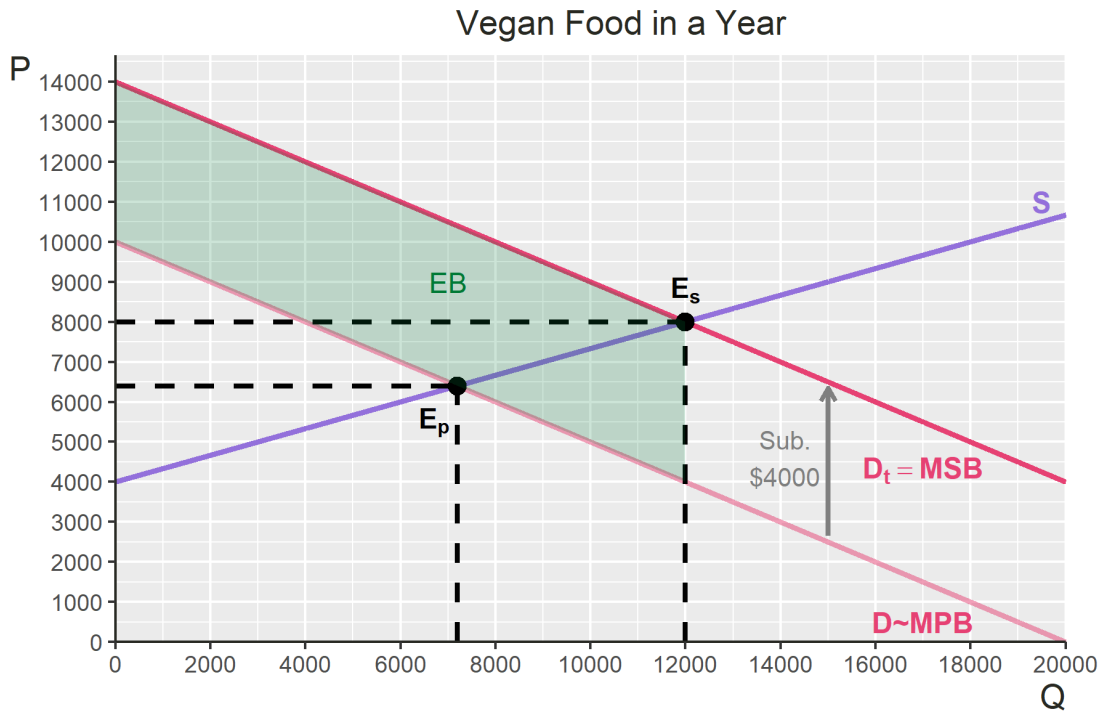
Positive Consumption Externality

- With a \$4000 subsidy, demand becomes MSB:



Positive Consumption Externality

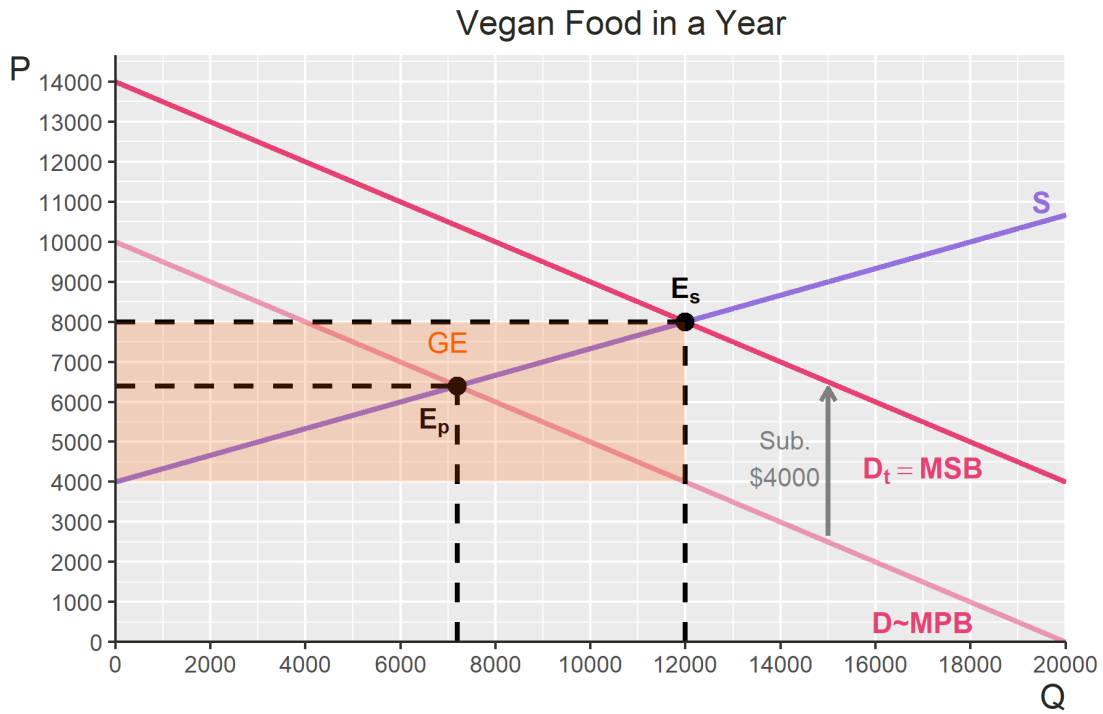
- The EB is now given by



$$EB = (12000)(14000 - 10000) = 48M$$

Positive Consumption Externality

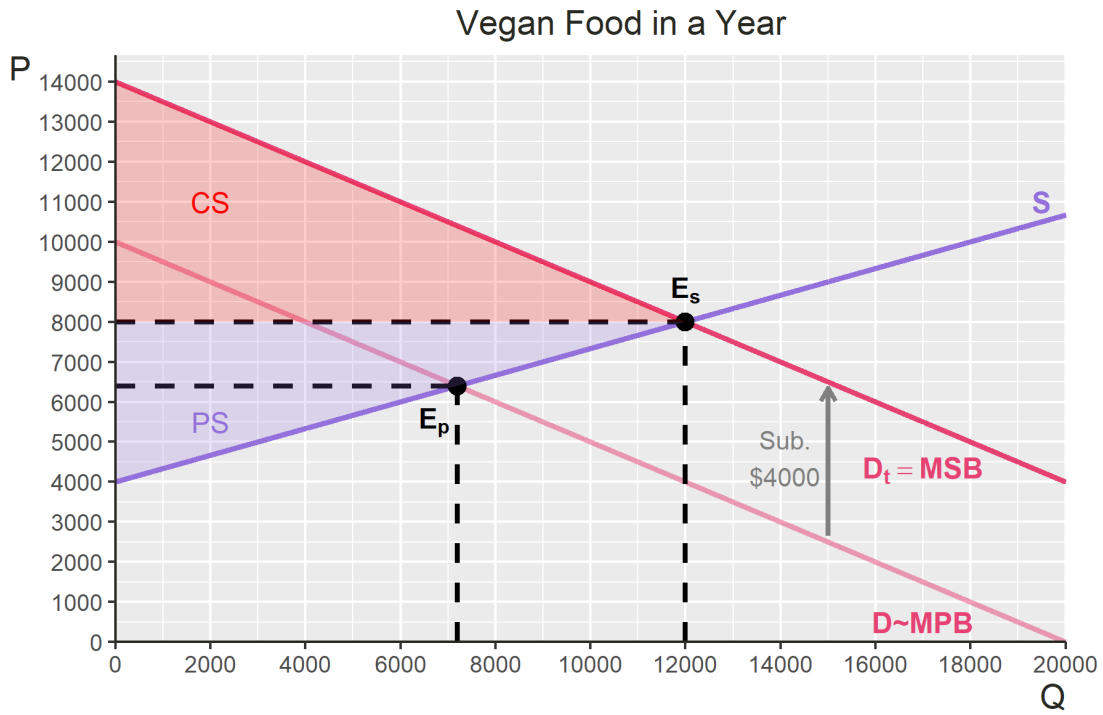
- And now, we have some GE



$$GE = (12000)(8000 - 4000) = 48M$$

Positive Consumption Externality

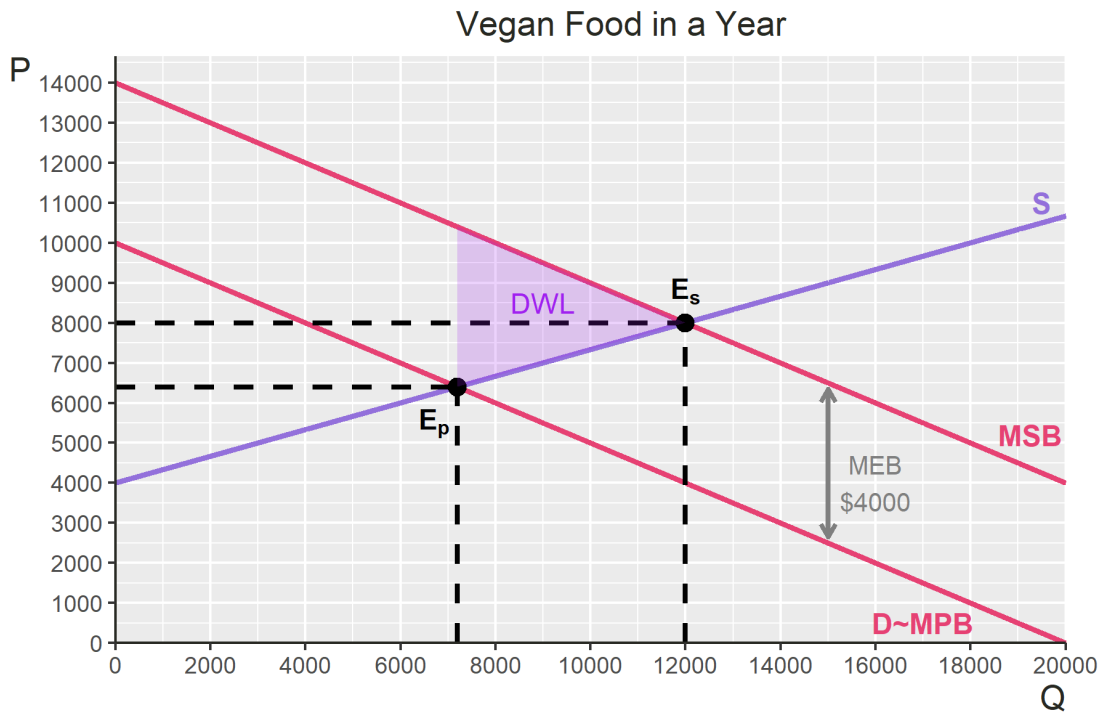
- After EB and GE cancel out, only CS and PS make up TS[1]



[1] Of course, that's not to say that EB and GE don't count towards TS, they just cancel out

Positive Consumption Externality

- Thus, the only numerical difference – which is DWL – is the following triangle



$$DWL = \frac{1}{2}(12000 - 7200)(10400 - 6400) = 9.6M$$

Where Supply Comes From

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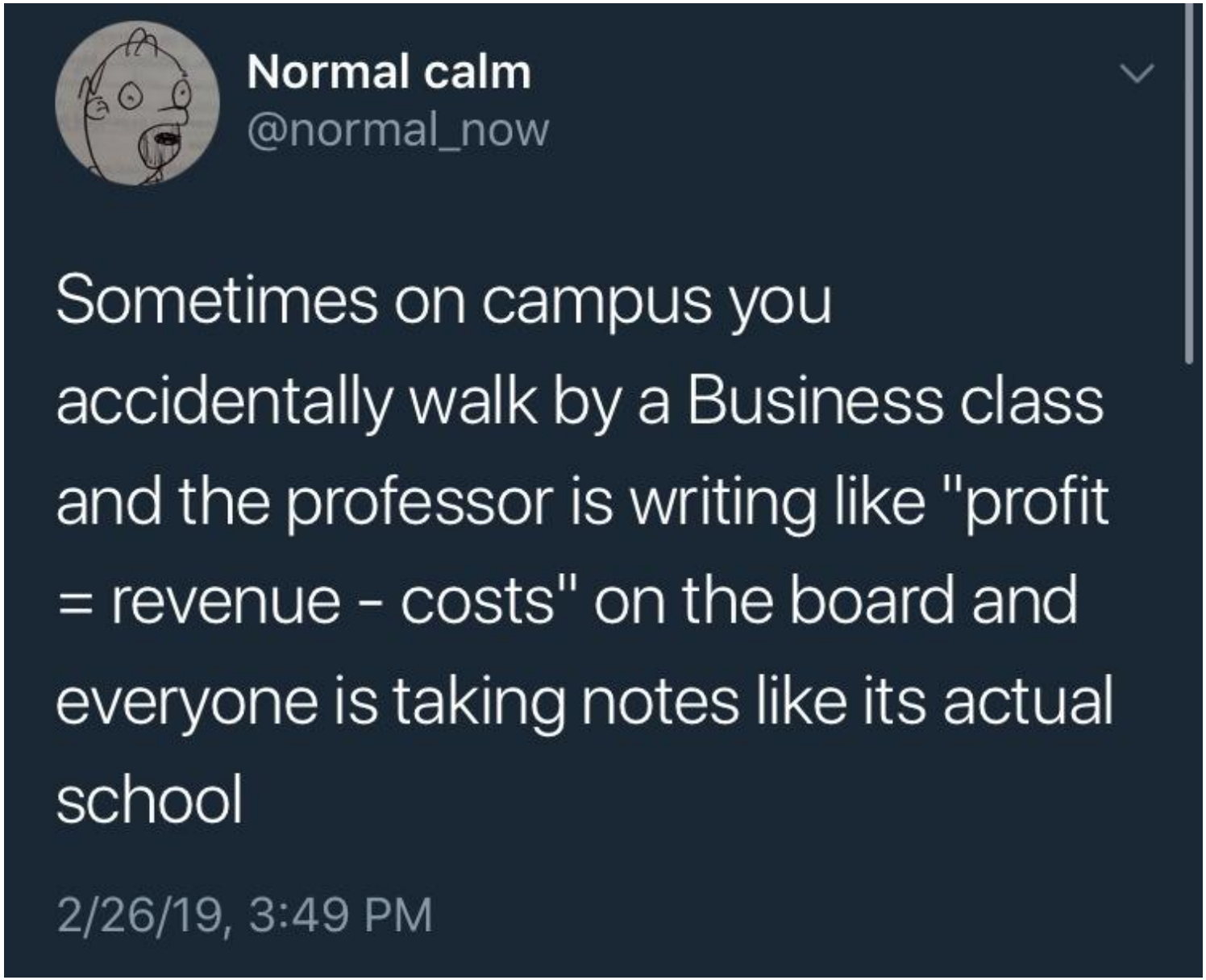
  - When Q increases, firms have to pay for more space, more labor, more machines, etc.
- Now, we want to explore that concept more in depth


Normal calm
@normal_now
Sometimes on campus you accidentally walk by a Business class and the professor is writing like "profit = revenue - costs" on the board and everyone is taking notes like its actual school
2/26/19, 3:49 PM

Economic Profit

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  where
  - π=profits
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- Total revenue is exactly how we have defined it before: how many goods you sell times the price you sell them at
- For total cost, however, We need to be careful; there are two kinds of costs we could be talking about: *accounting* costs vs *economic costs*

Accounting Costs vs Economic Costs

- I will start by noting that this will be an important *conceptual* point to understand, but it will not be a huge worry once we start going into problems[2]

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- **Economic Costs** refers to factoring in both explicit costs and implicit costs, which gives rise to **Economic Profit**:
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  - Jake therefore makes $500 - 750 = -\$250/\text{month}$, i.e. $(-250)\,(12) = -\$3000/\text{year}$, in economic profit

Context for Economic Profit

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    - However, in the background, we are assuming we are talking about economic profit in this class, rather than accounting profit, and that implicit costs are already being factored in

Production Table

- The following table shows an example **production function**: the relationship between the quantity of inputs used to make a good and the quantity of output of that good

# Workers (Labor)	**# of** x (Output)	**Startup Costs** (Fixed Cost)	**Wage** (Cost of Labor)
0	0.0	\$50	\$10
1	4.0	\$50	\$10
2	5.6	\$50	\$10
3	6.9	\$50	\$10
4	8.0	\$50	\$10
5	8.9	\$50	\$10
6	9.7	\$50	\$10
7	10.5	\$50	\$10
8	11.3	\$50	\$10
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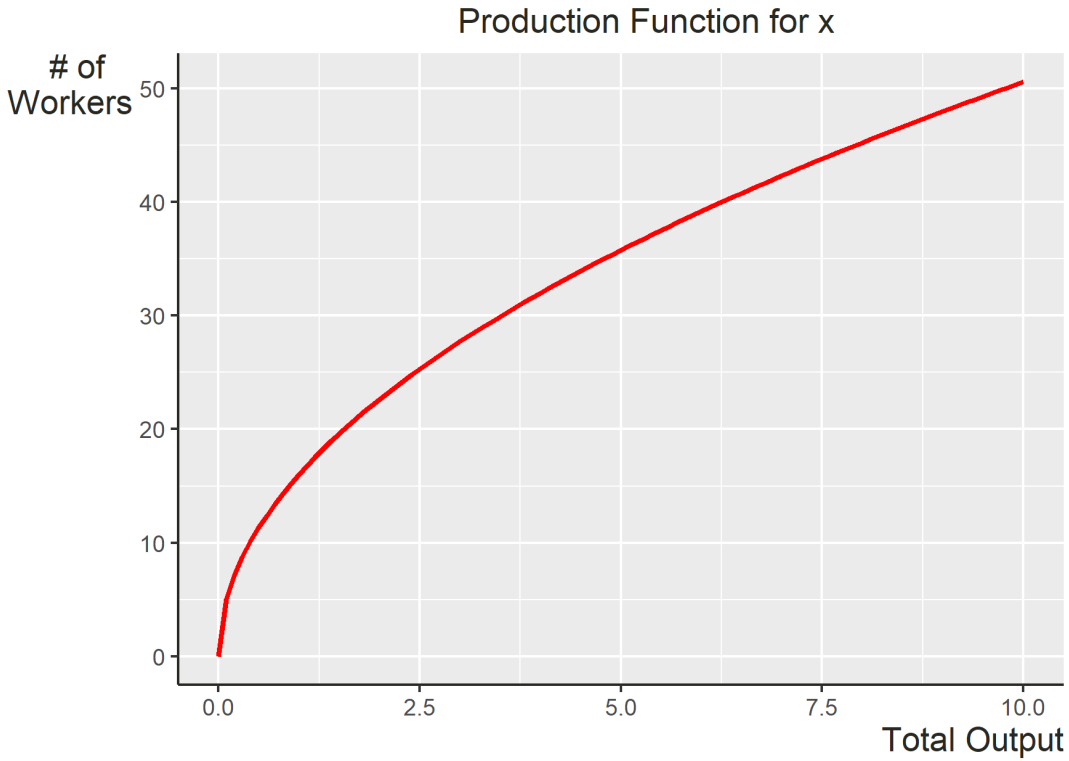
Production Function

- The aforementioned table, when graphing output to # workers, induces the following graph of the firm's production function:



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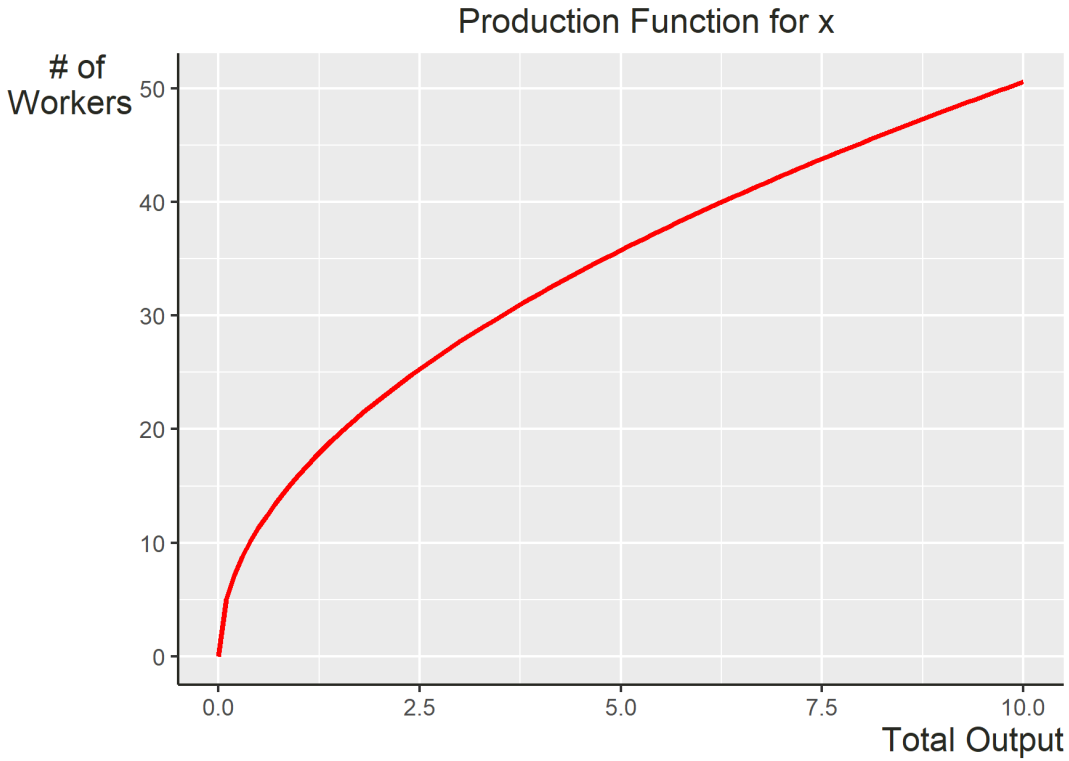

- Note how the curve flattens out (i.e., the slope diminishes) as Q increases

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- If we have one input, then the slope of the production function will equal the marginal product of that input
  - In fact, if we graph output to any input, then the slope of that curve will be the marginal product of that input

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# Workers (Labor)	**# of** x (Output)	**Startup Costs** (Fixed Cost)	**Wage** (Cost of Labor)	MP_L
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2	5.6	\$50	\$18	1.6
3	6.9	\$50	\$18	1.3
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- As each extra worker is hired, the contribute fewer x. What is this called?
  - *Diminishing marginal returns*, a concept we have seen before
  - While we may see increasing or constant MPs, economists believe that eventually a firm will experience diminishing marginal products

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Marginal Thinking

- Suppose the price of x is \$20, and we can sell all of our output. How many workers should we hire?
- Suppose we've hired three workers. Should we hire a fourth?
  - The fourth worker will cost \$18, but will earn us $1.1\left(\$20\right) = \$22$: they are worth the hire!
- Suppose we've hired four workers. Should we hire a fifth?
  - The fifth worker will cost \$18, and will earn us $0.9\left(\$20\right) = \$22$: they are barely worth the hire
  - We will say they are worth it, because if we consider a continuum of workers (maybe via hiring part time), then the 4.9th worker will be worth it, as will be the 4.95th, etc.
- Should we hire any more?
  - The fourth worker will cost \$18, but will only earn us $1.8\left(\$20\right) = \$16$: they are not worth it
- Thus, we should hire 5 workers

Marginal Thinking(cont.)

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- This idea of having marginal things equal each other will be a key idea for us in the coming chapters
- The idea will always be the same: if it's profitable to keep going, keep going; if we are losing profit, go back; if we break even, we are right on the sweet spot

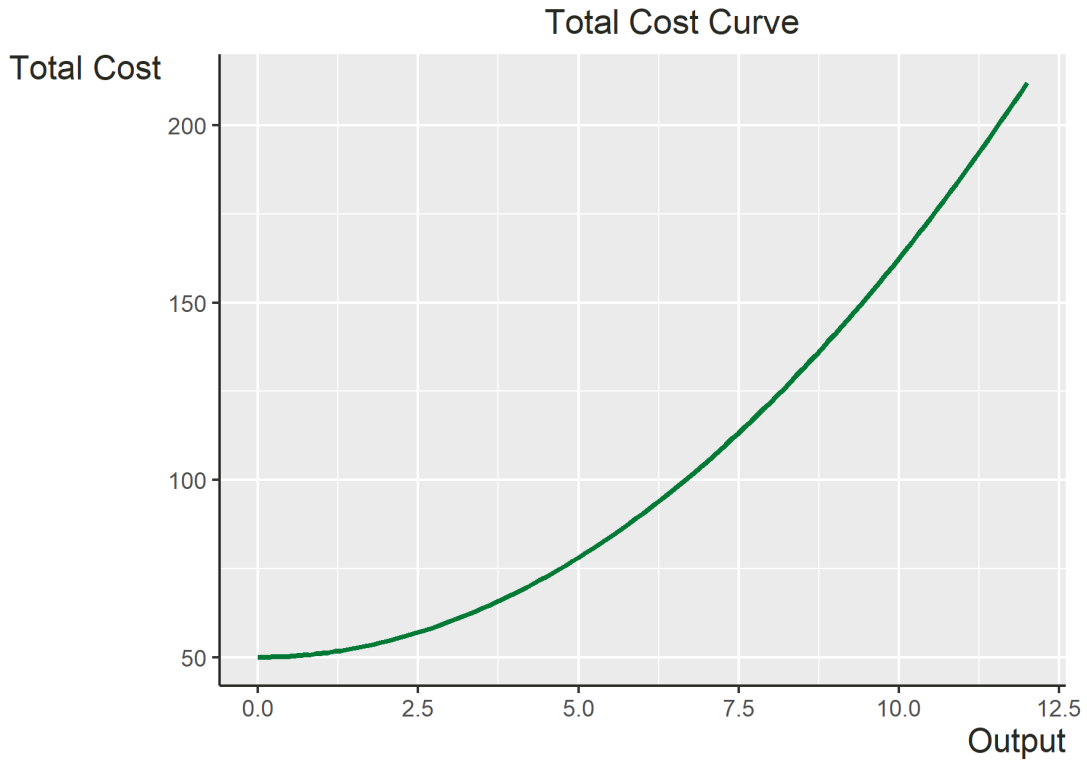
Total Costs

- The production table also generates for us a *total cost* column, shown below

# Workers (Labor)	**# of x** (Output)	**Startup Costs** (Fixed Cost)	**Wage** (Cost of Labor)	**Total Cost**
0	0.0	\$50	\$18	\$50
1	4.0	\$50	\$18	\$68
2	5.6	\$50	\$18	\$86
3	6.9	\$50	\$18	\$104
4	8.0	\$50	\$18	\$122
5	8.9	\$50	\$18	\$140
6	9.7	\$50	\$18	\$158
7	10.5	\$50	\$18	\$176
8	11.3	\$50	\$18	\$194
9	12.0	\$50	\$18	\$212

Total Cost Curve

- Plotting Total Cost against output yields our total cost curve:



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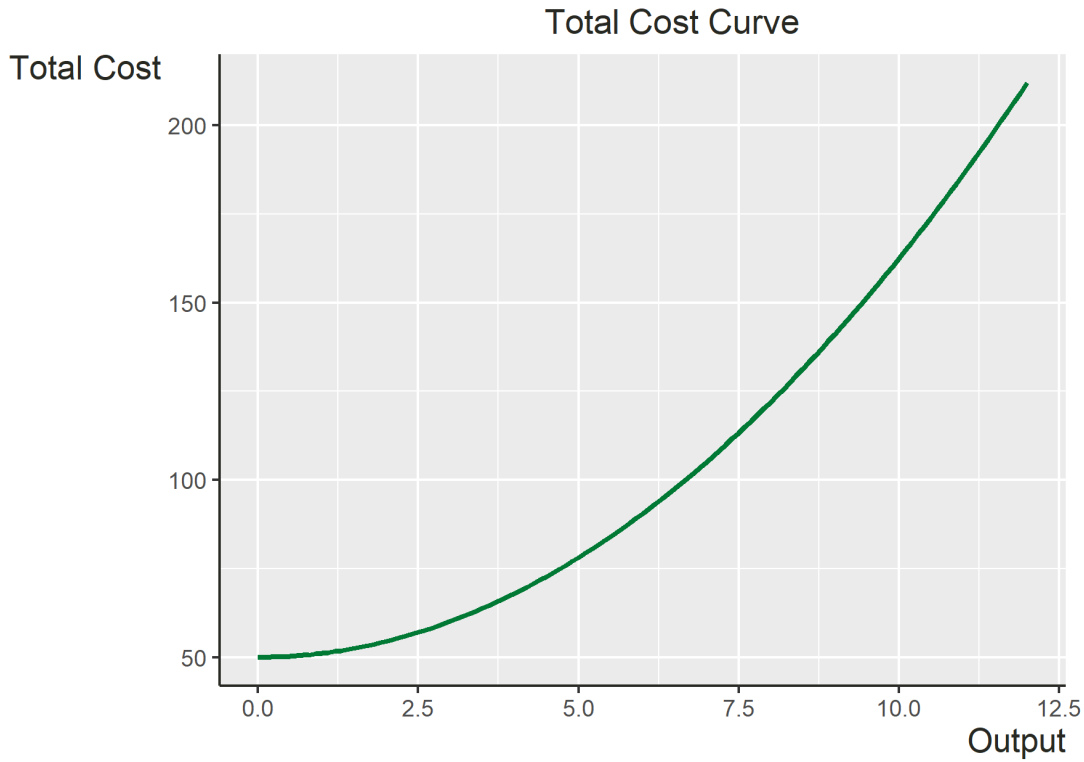

- Note: the total cost curve slopes upward (and eventually becomes exponential) because of diminishing marginal returns in the production function

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        - However, this is the same as: when the firm is crowded, producing an additional unit of x requires a lot of additional labor and is thus very costly. Therefore, when the quantity produced is large, the total-cost curve is relatively steep.

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  - The sum of fixed costs (FC) and variable costs (VC) is total cost (TC):

$$TC = FC + VC$$

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  - Larger machines

Average Costs and Marginal Cost

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- In practice, marginal cost looks just like the other marginal objects we have talked about: the cost of the next (or last) thing

Example Cost Table

- Fill in the following cost table

Output	FC	VC	TC	MC	AFC	AVC	ATC
0	100		100				
1	100	4					
2	100	16	116				
3	100	36					
4	100	64					
5	100		200				
6	100		244				
7	100		296				
8	100	256					
9	100	324					
10	100		500				

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- This motivates the use of a curve

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- Department grading guidelines indicate that on average, $55\% \pm 10\%$ of students in lower-division courses get A's and B's. Therefore, if you got above the median score on the exam, you probably got somewhere around an A/B (for the exam)

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- A harder midterm *can sometimes* make for an easier final, as now I know – to a degree – what length/difficulty *not* to give

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- In thinking about partial credit, balance yourself between finding a problem in detail, and getting the key ideas across for the problems you are unsure on

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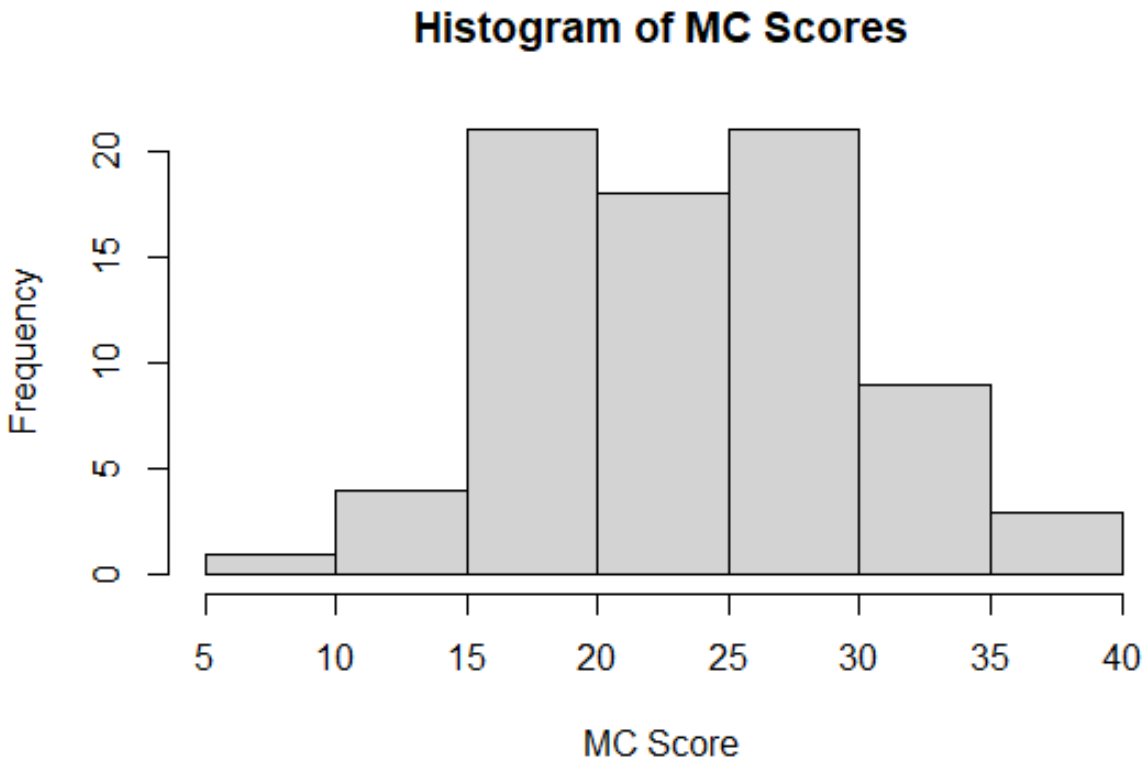
  - Above a 25 means you got an A/B for the MC portion of the exam (if you're above a 22 or so, you are basically in the same boat)

MC Histogram

- The histogram of scores for the MC section, by 5s, is shown below



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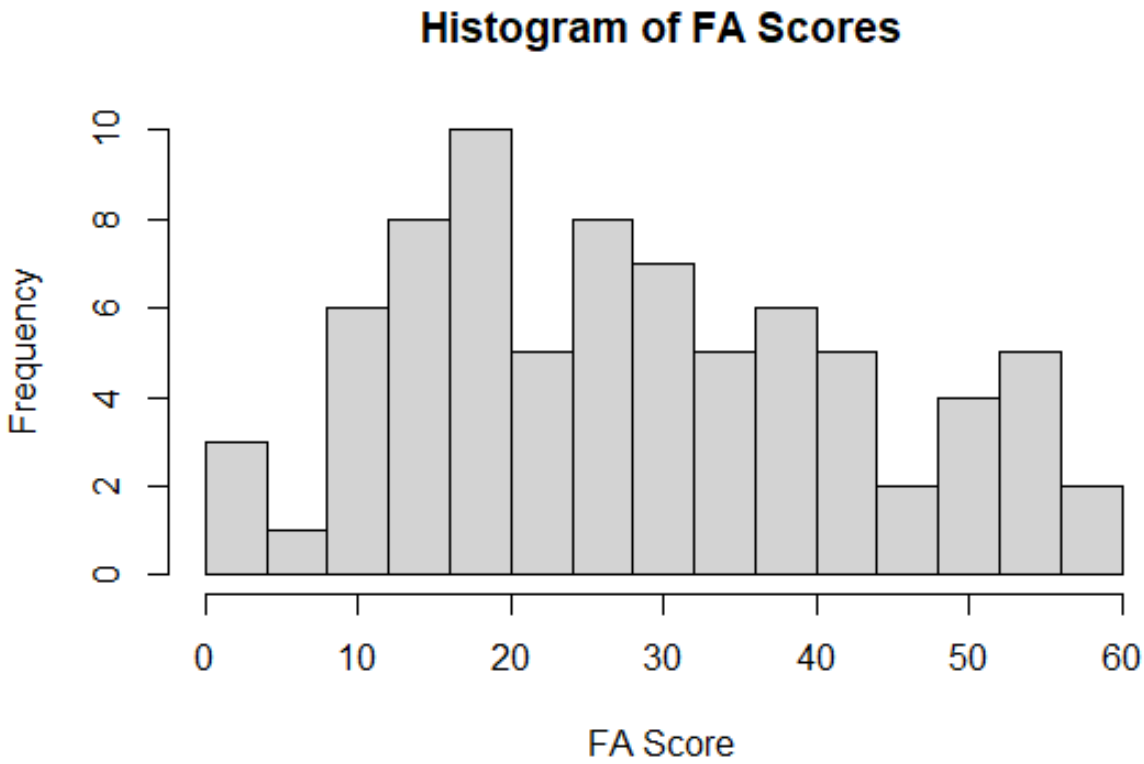
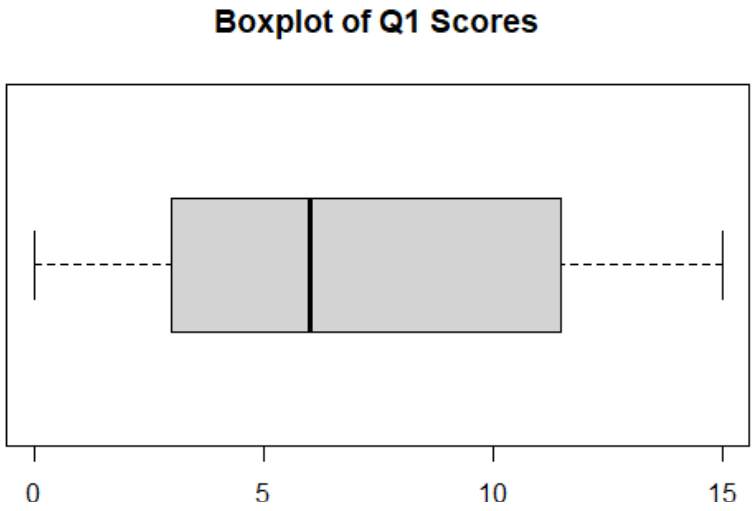
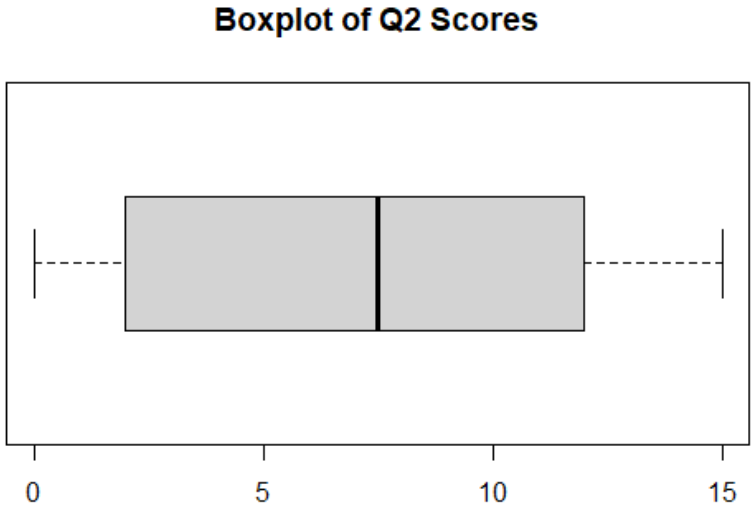
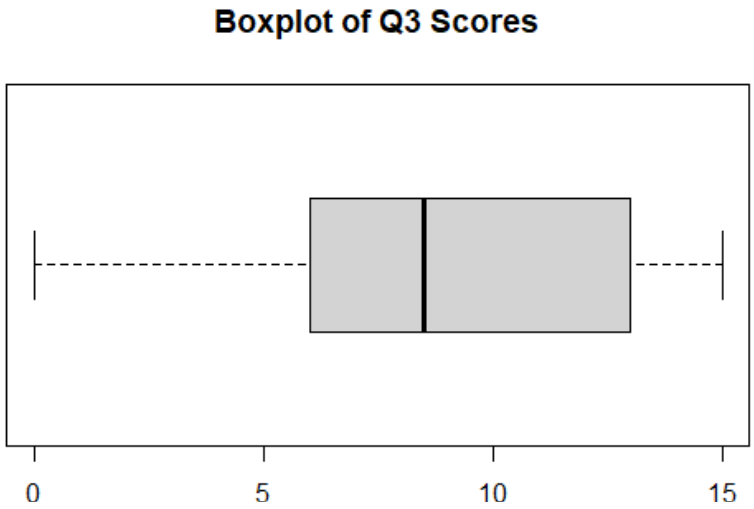


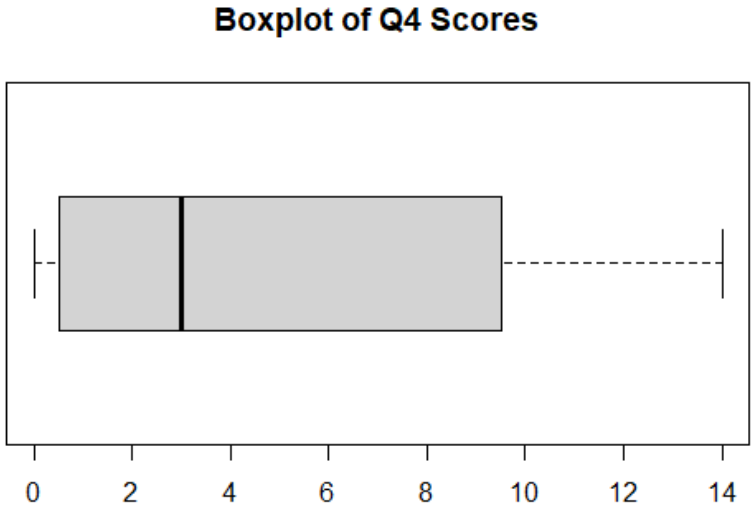
FA Q1 and Q2





FA Q3 and Q4


Boxplot of Q3 Scores
0
5
10
15


Boxplot of Q4 Scores
0
2
4
6
8
10
12
14

Midterm Exam Descriptive Statistics

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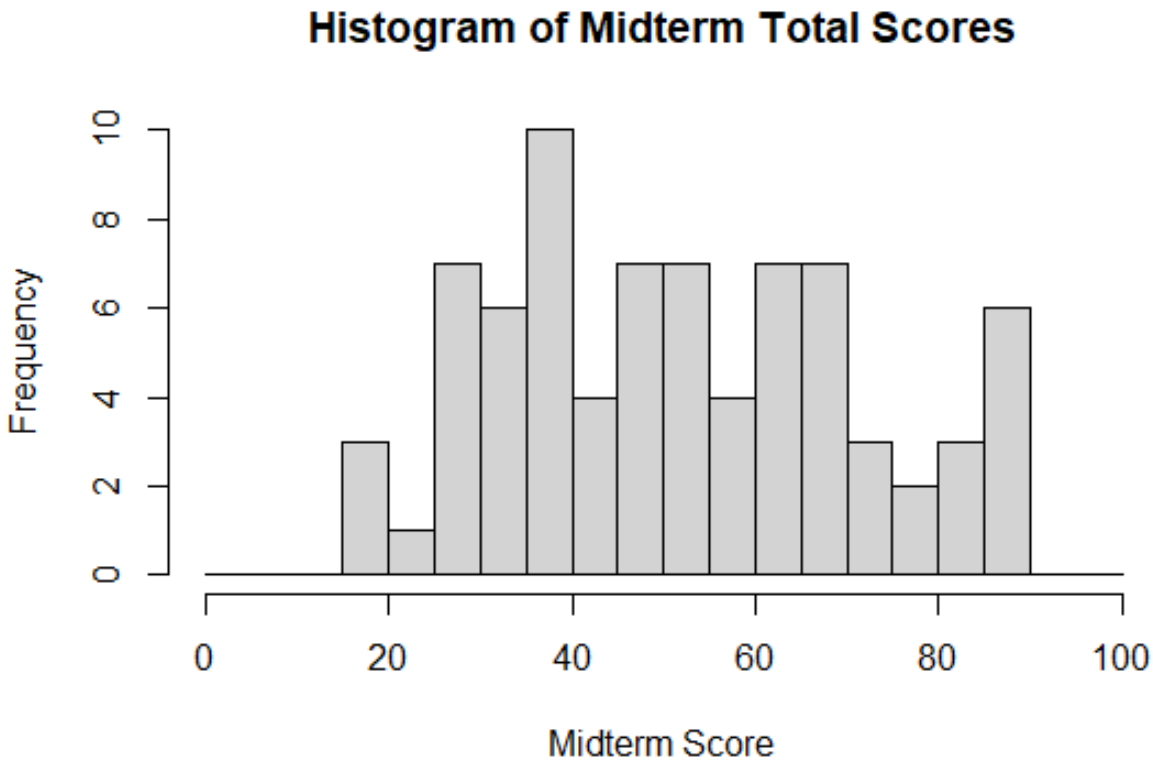
  - Above a 51 means you got an A/B for the FA portion of the exam (if you're above a 22 or so, you are basically in the same boat)

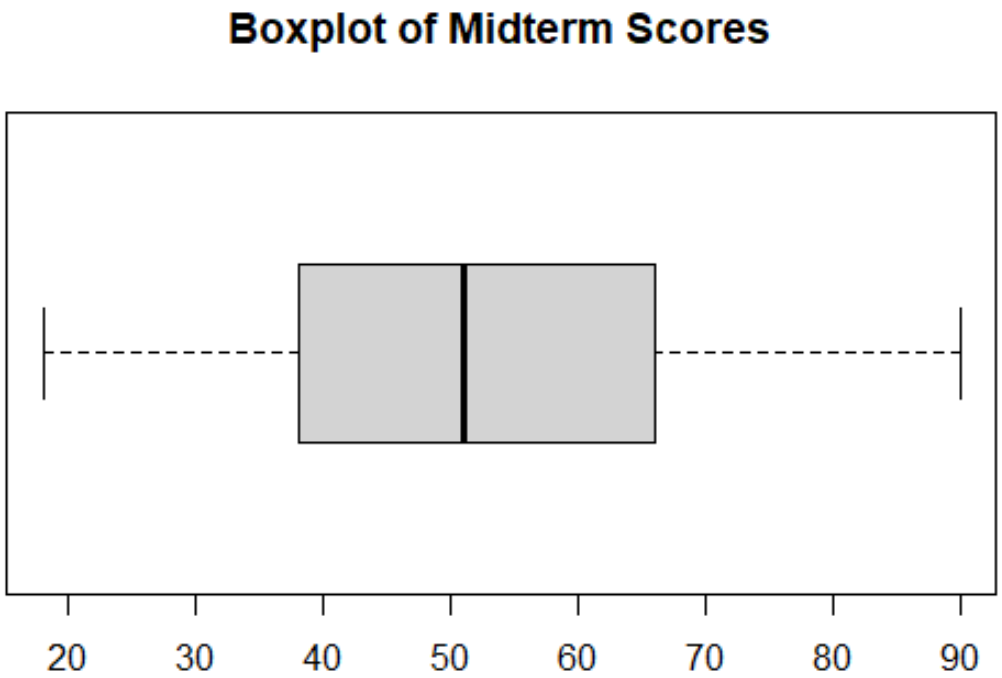
Midterm Histogram

- The histogram of scores for whole exam, by 5s, is shown below



Midterm Boxplot

- The box plot for the whole exam is shown below



Reminder: The 1st quartile was 38, the second quartile (the median) was 51, the 3rd quartile was 66, and the high was 90

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  - If you have above a 60ish, that's a C
  - If you have above a 40-45ish, that's a D