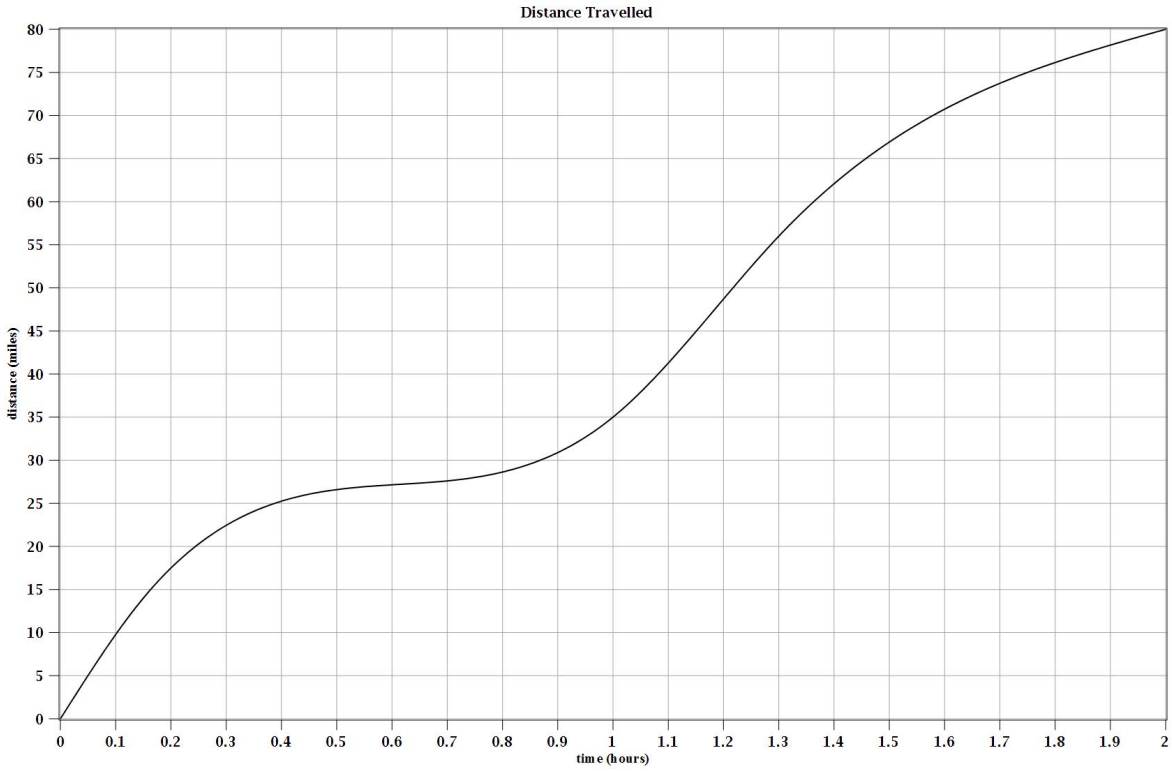
Math 111 - Midterm 1 Review

1. The following shows the distance traveled by a car. Answer the following questions. If your graph gets too messy, you can print a clean one to continue. Include units in your answers.



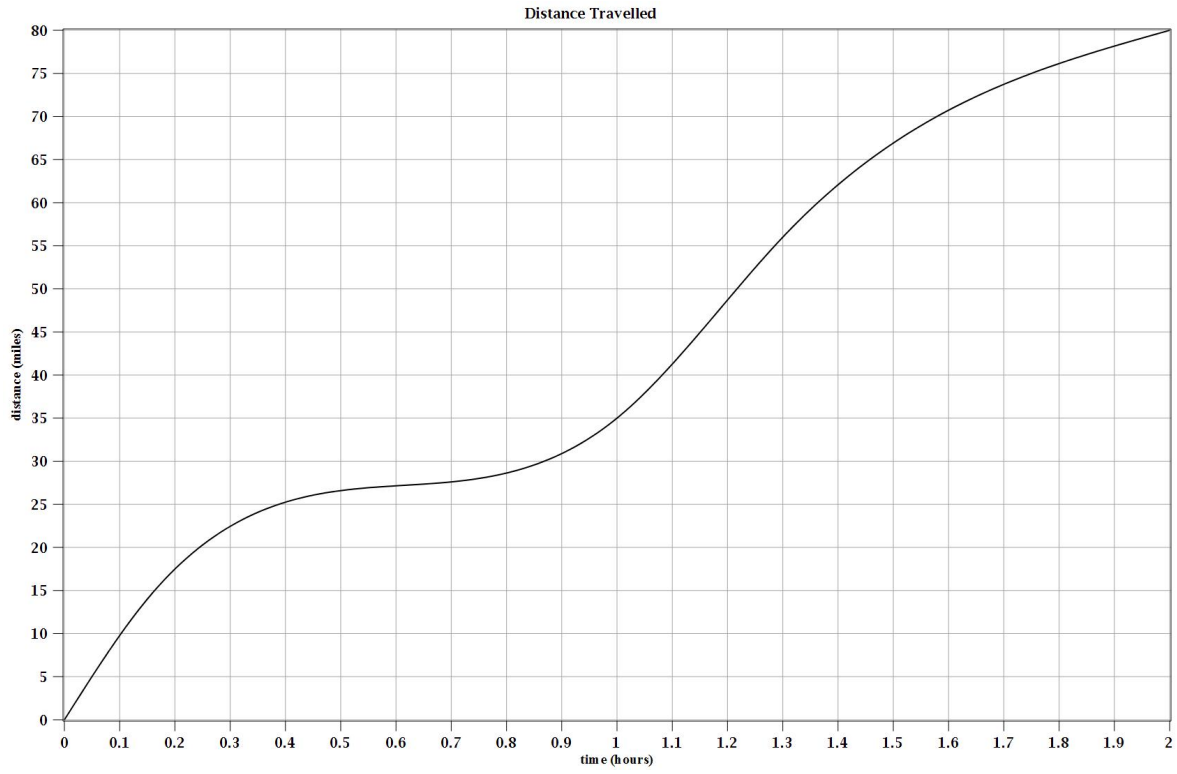
(a) When has the car travelled 50 miles?

(b) How far is the car from its starting point at the end of the first hour?

(c) What is the Average Trip Speed of the car at 90 minutes?

(d) What is the Average Speed of the car in the last 30 minutes of this journey?

(e) What are the lowest and highest values of the car's Average Trip Speed?



(f) Find the time(s) when the Average Trip Speed of the car is 45 mph.

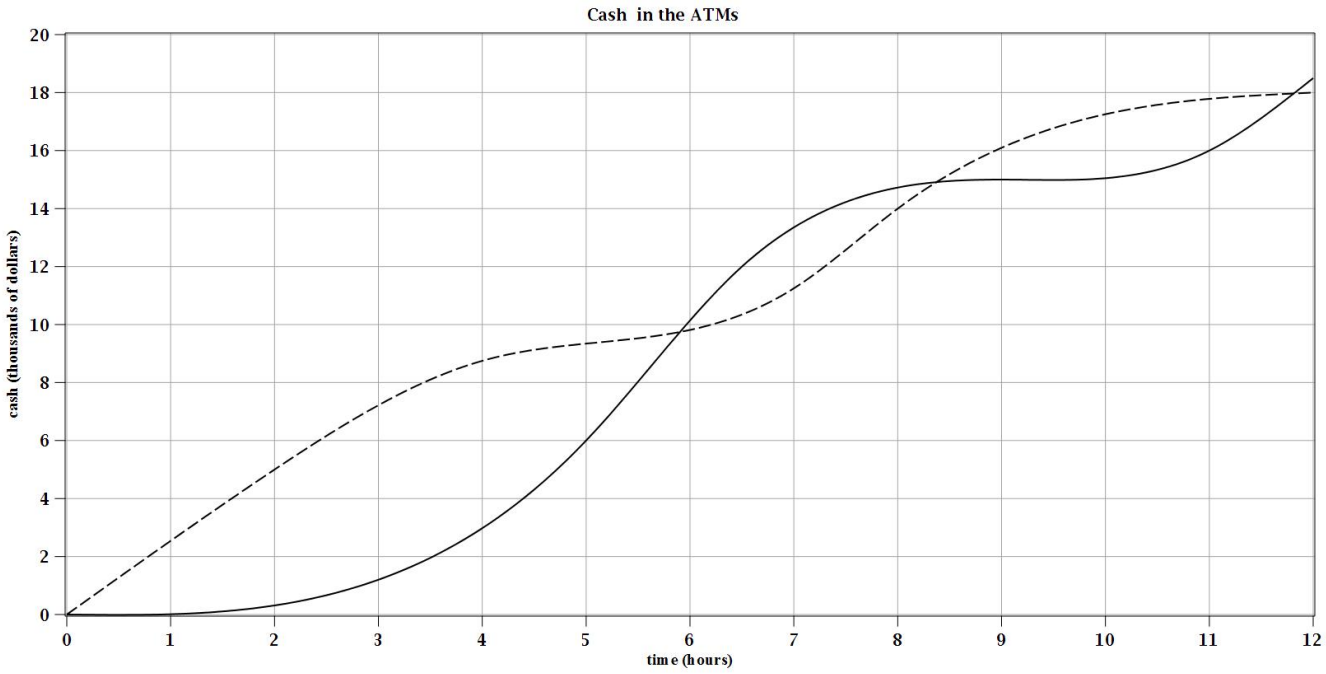
(g) Find a 24 minute time interval when the Average Speed is 55 mph.

(h) A second car starts at the same place and travels in the same direction at a constant speed of 45 mph. What is the Average Trip Speed of the second car at 30 minutes? At one hour? At 90 minutes? At 1.23456789 hours?

(i) List the intervals when the second car is ahead of the first car.

(j) Find the maximum distance between the two cars in this 2 hour period. Which car is ahead?

2. The following shows the total money deposited (dashed) to and the total money withdrawn (solid) from the ATM machines of a bank after noon. At noon, there is \$3450 in the machines. Include units in your answers.



(a) How much money is in the ATMs at 7 PM?

(b) At what time(s) is there \$3450 in the ATMs?

(c) What is the overall average rate of change out of the ATMs at 3 PM?

(d) What is the overall average rate of change in to the ATMs at 3 PM?

(e) What is the overall average rate of change of money in the ATMs at 3 PM?

(f) Find a 4 hour period when \$6000 is deposited to the ATMs.

(g) Find the time interval(s) when there is more than \$7450 in the machines.

3. Let $B(t)$ be the number of books in a small public library (in the building, not checked out) at time t in days from January 1, 2013. Translate the following sentences into math:

   Example: There were 3657 books on February 12, 2013:

   $$B(43) = 3657.$$

   (a) The overall rate of change in the number of books for the first 100 days of the year was 125 books per day.

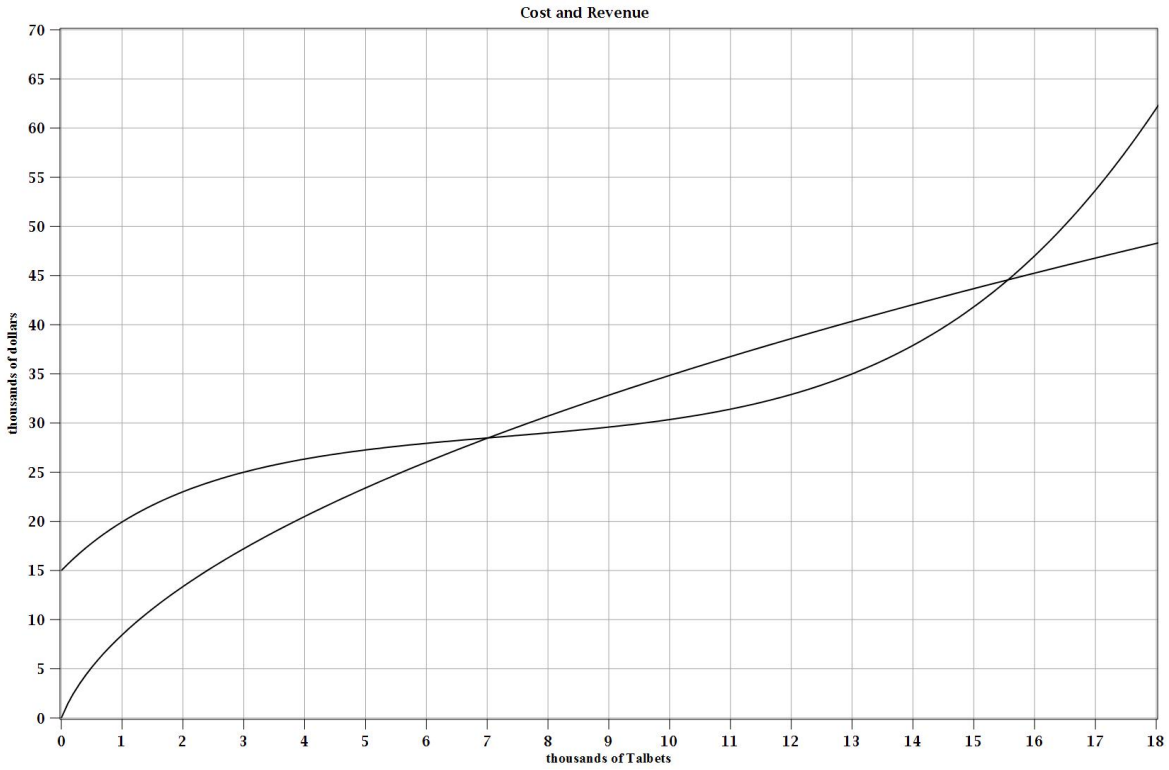
   (b) The average rate of change in the number of books from March 1 to June 5 was 132 books per day.

   (c) The number of books in the library decreased by 267 during the month of August (From July 31 to August 31).

   (d) The average rate of change in the number of books in the h days after January 6 was 121 books per day.

   (e) The number of books on September 1 and October 15 were the same.

4. The following shows the Total Cost and Total Revenue functions for producing and selling Talbets. Include units in your answers.



(a) Which one is the Total Cost function? What is the Fixed Cost? Which one is the Total Revenue function. You can't make money if you don't sell anything.

(b) Approximate the loss at 500 Talbets.

(c) When do you break even?

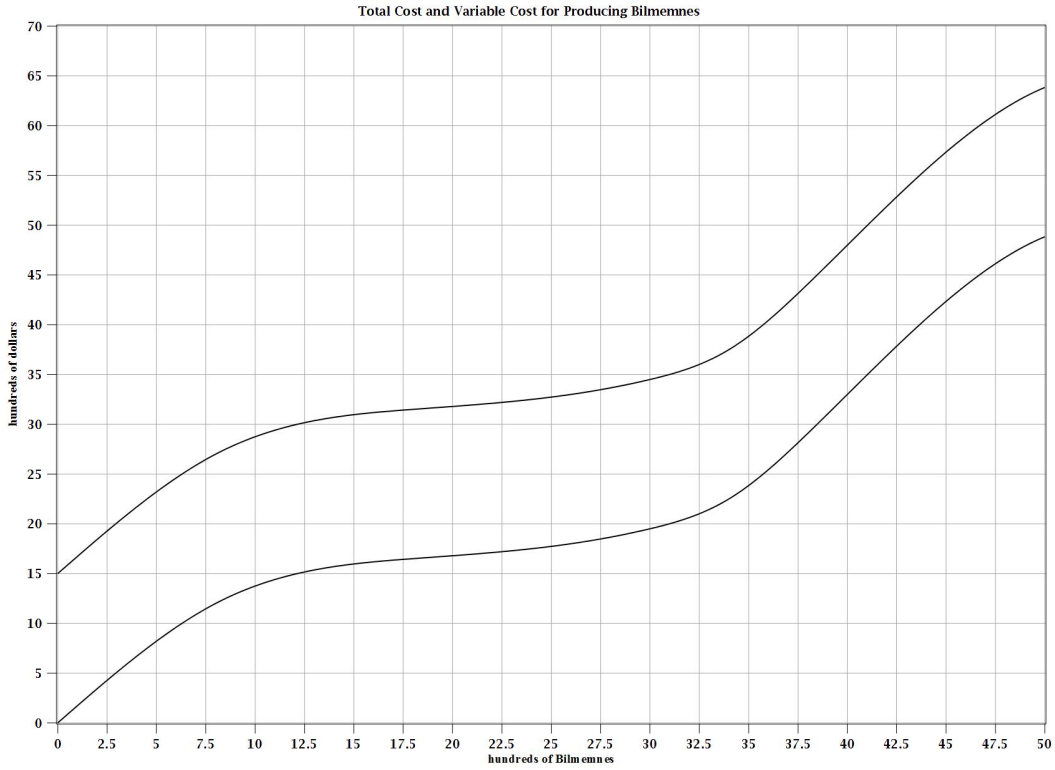
(d) Approximate the profit at 13,500 Talbets.

(e) What is the Marginal Cost at 10,000 Talbets?

(f) What is the Marginal Revenue at 10,000 Talbets?

(g) At about 1000 Talbets, will your profits increase or decrease if you sell more Talbets?

5. The following shows the Total Cost and Variable Cost functions for producing and selling Bilmemnes. Include units in your answers.



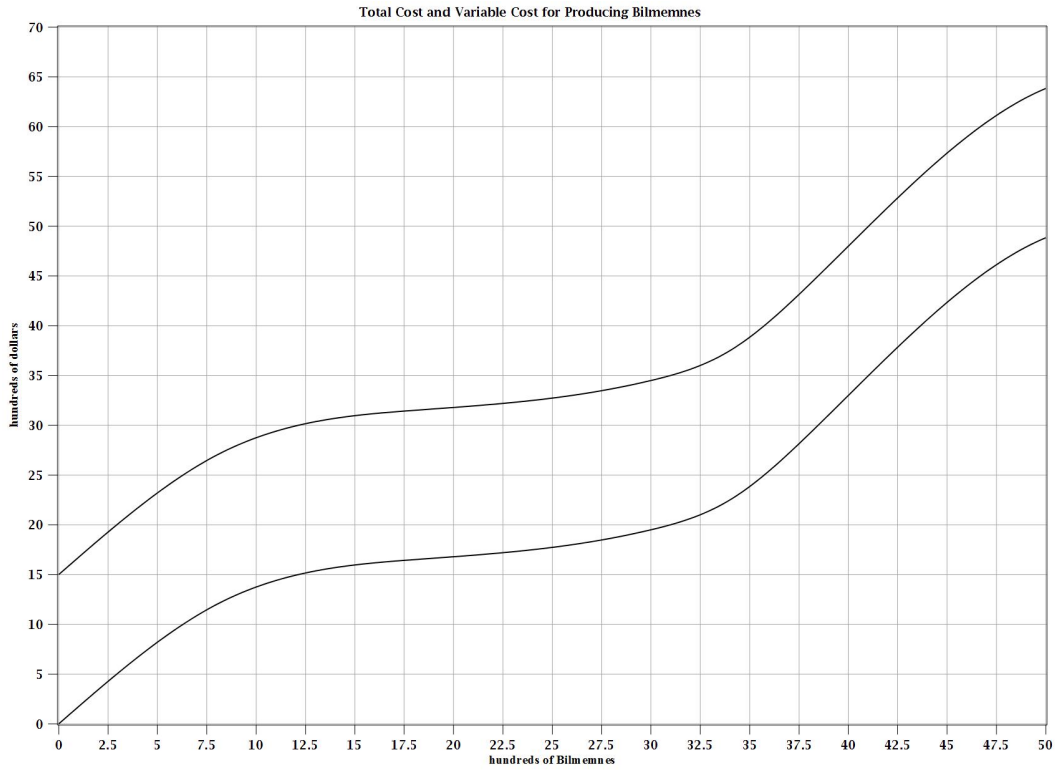
(a) Which one is the Total Cost function? Which one is the Variable Cost function? What is the Fixed Cost?

(b) Compute the Average Cost at 2750 Bilmemnes.

(c) Compute the Average Variable Cost at 1750 Bilmemnes.

(d) At what level of production is your Average Cost 200 cents per Bilmemne.

(e) At what level of production is your Average Variable Cost 70 cents per Bilmemne.



(f) What is the smallest value of the Average Cost?

(g) What is the smallest value of the Average Variable Cost?

(h) What is the Breakeven Price?

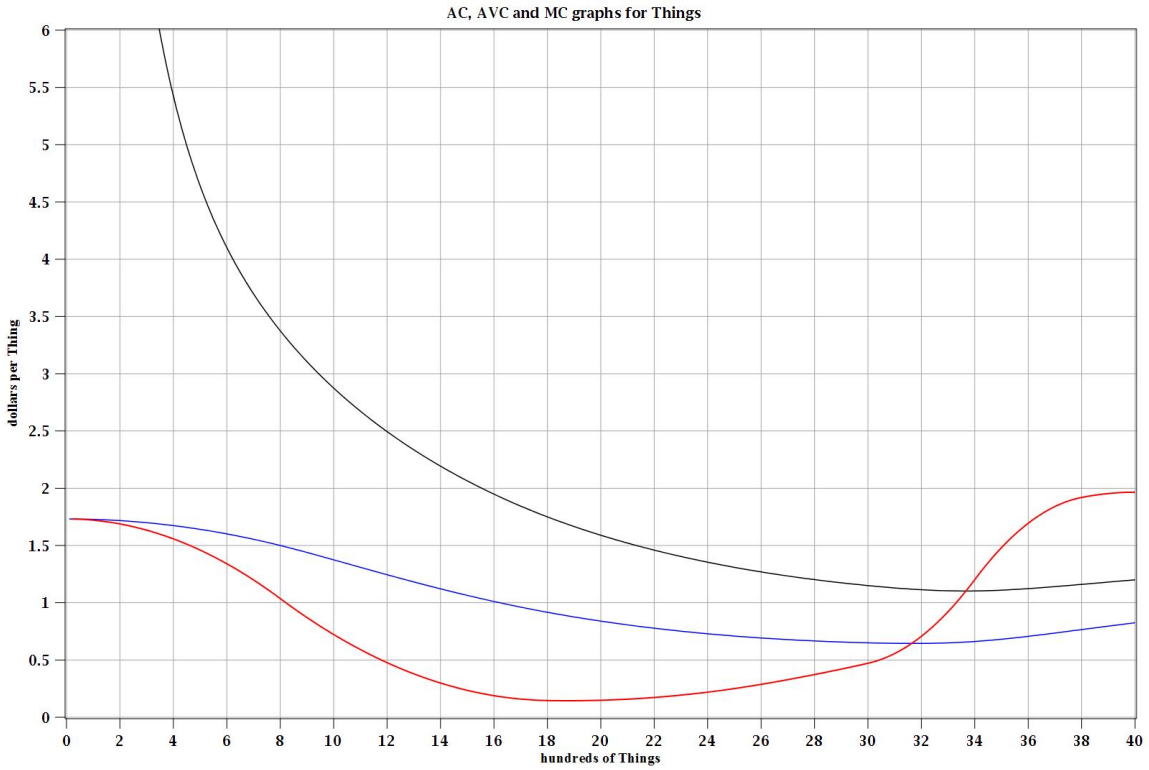
(i) What is the Shutdown Price?

(j) What do you advise me to do if the market price is 50 cents per Bilmemne? Why?

(k) If the I sell each Bilmemne for 150 cents, what is my maximum profit?

(l) Find the interval where the Marginal Cost is at most 150 cents per Bilmemne.

6. The following shows the AC, AVC and MC graphs for producing and selling Things. Include units in your answers.



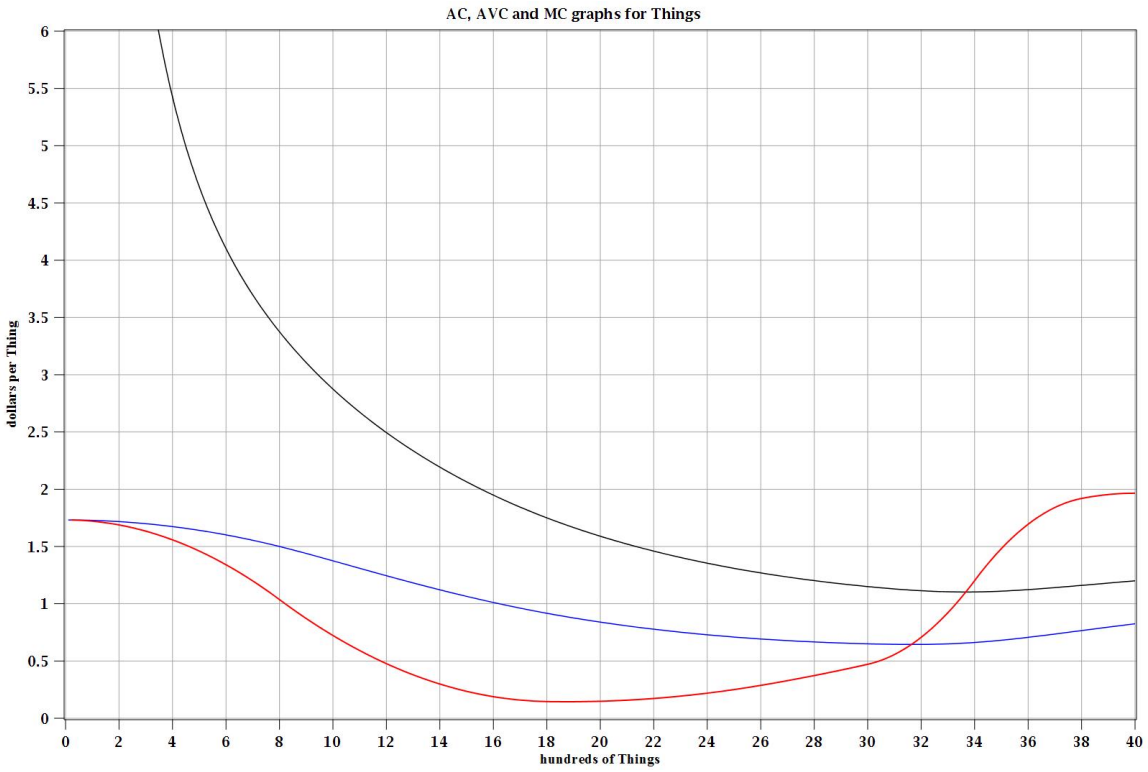
(a) Compare the definitions of $MC(0)$ and $AVC(1)$. Which two graphs should be for MC and AVC?

(b) Which one is higher: $AVC(1)$ or $AC(1)$? At this point, looking at where the three graphs start, you should know which one is the AC graph.

(c) Can AC and AVC graphs ever intersect, i .e. can we have $AVC(q) = AC(q)$? What happens to the FC if you set the equa to each other? At this point you should have labelled all three. If not, look at the example from lecture to label all three.

(d) Approximate the Total Cost of producing 1400 Things. Approximate the Variable Cost of producing 1400 Things. What is the Fixed Cost?

(e) Approximate the Total Cost of producing 3000 Things. Approximate the Variablel Cost of producing 3000 Things. What is the Fixed Cost? Compare your Fixed Cost with the one from the previous one. Hopefully, they are close, if not the same. Why?



(f) What is the smallest value of the Average Cost?

(g) What is the smallest value of the Average Variable Cost?

(h) What is the Breakeven Price?

(i) What is the Shutdown Price?

(j) If the I sell each Thing for \$1.80, what is my maximum profit?

7. Algebra.

(a) Solve for x in

$$9(x-12) = 30 - (x-2).$$

(b) Solve for y in

$$\frac{y-1}{3} + 1 = \frac{2}{3}(y+2).$$

(c) Solve the inequality and graph the solution;

$$3(2x+5) - 2 > 9x + 12.$$

(d) Solve the inequality and graph the solution:

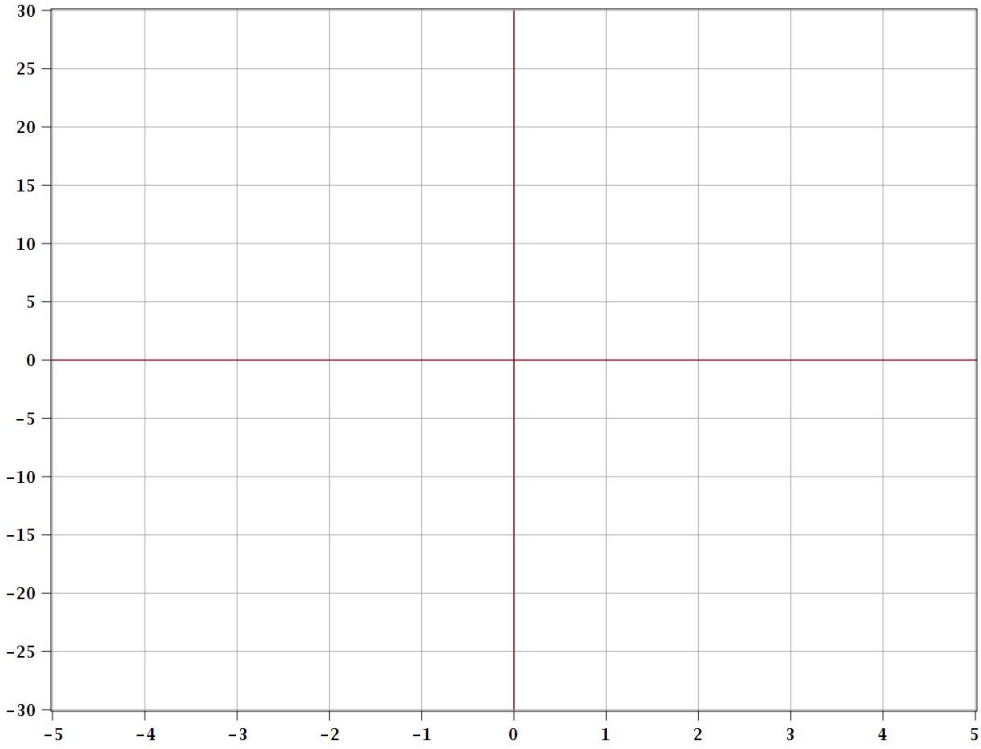
$$2(5x+3) \leq 6x + 2.$$

(e) Solve for e in

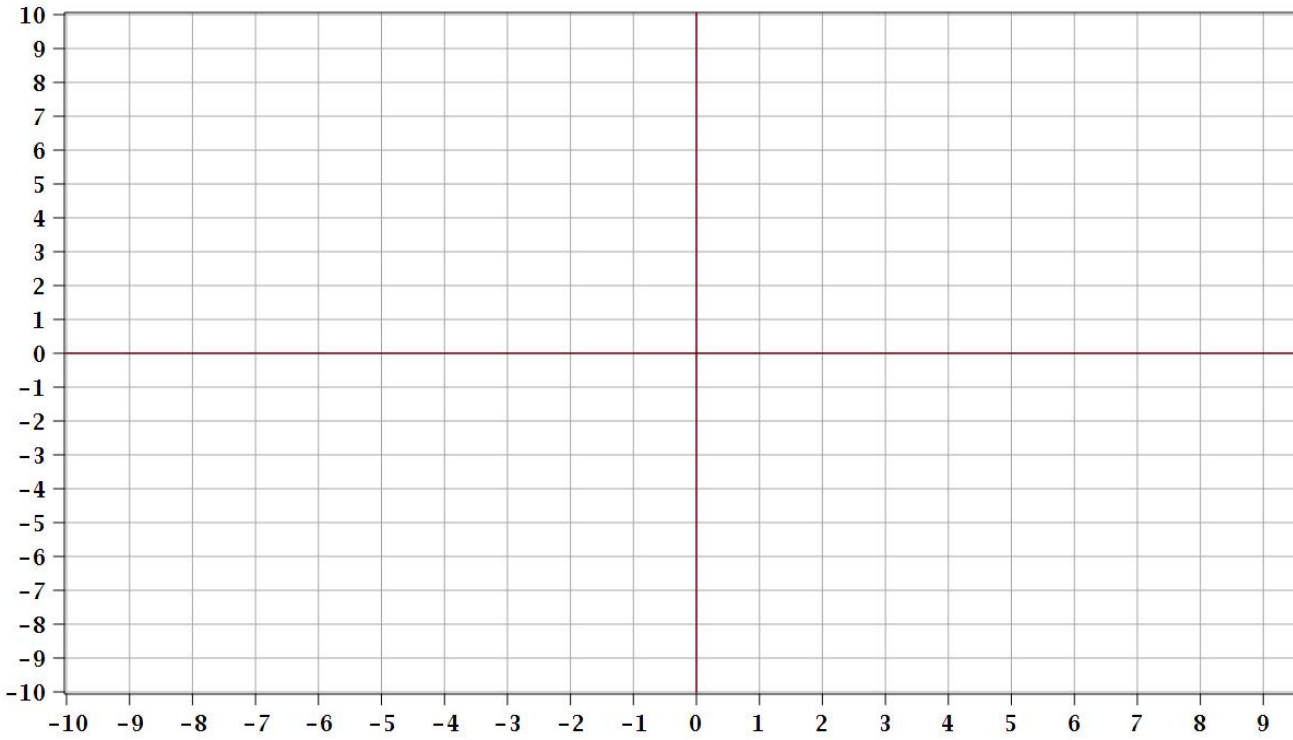
$$\frac{e+R}{S} = Te + R.$$

8. Graphing.

(a) Graph $y = 5x + 3$. What is the x-intercept? What is the y intercept?



(b) Graph $2x + 3y = 12$. What is the x-intercept? What is the y intercept?



9. The water and sewage (what goes in must come out, right?) company determines the monthly bill for a residential customer by adding water usage of 3.54 cents per gallon to its base charge of \$32.29 per month. Write an equation for the monthly charge y in terms of x, gallons of water used. Let y be measured in dollars. What is my October bill if I use 450 gallons of water in my house? Be careful with units.

10. Warren has $\$180,000$ to invest.There is one relatively safe investment fund that has an annual yield of 7% and another, riskier fund that has a 12% annual yield. How much should he invest in each fund if he wants to earn $\$17,500$ per year from his investments?

11. Saige is making and selling dresses for dolls. Her fixed costs are \$120. It costs \$6.50 to make each dress. She sells each dress for \$12. Write down her Total Cost $TC(x)$ and Total Revenue $TR(x)$ functions where x is the number of dresses she makes and sells. When will she make a profit?