Problem 1. Consider the following two equations of lines:

$$y = -3x - 5 \qquad\qquad y = \frac{1}{3}x + \frac{5}{3}$$

a) Find 4 solutions to the two linear equations.

b) Carefully graph the equations on the same set of axes.

c) Find the intersection points of the lines and write them as an ordered pair (by using your graph)

d) Use your graph to solve this equation $\frac{1}{3}x + \frac{5}{3} = 2$.

e) Solve the following equation by rules of algebra. Carefully write out each step $\frac{1}{3}x + \frac{5}{3} = 2$.

f) Explain the relation between solving the equation and finding the answer on a graph.

g) Repeat 4–6 for the equation $-3x - 5 = \frac{1}{3}x + 53$

h) Discuss how you could check your answers, then check them!

Problem 2. The number of Americans without health insurance was 46.7 million in 2010, and it increased by about 1.04 million per year until 2013. Let n be the number in millions of Americans without health insurance at t years since 2010.

a) Identify the slope of the model. What does it mean in this situation?

b) Identify the y-intercept. What does it mean in this situation?

c) Write an equation to model this situation.

d) Estimate when 49 million Americans did not have health insurance.

e) How many millions of people were without health insurance in 2012?

Problem 3. The minimum salary for a hockey player in the National Hockey League was \$500 thousand in 2010, and it increased by about \$14 thousand per year until 2015. Let s be the minimum salary (in thousands of dollars) at t years since 2010.

a) Identify the rate of change of this situation. What does this mean in this situation?

b) Identify the y-intercept for creating a linear model. What does it mean in this situation?

c) Write an equation to model this situation.

d) What was the minimum salary in 2015?

e) When was the minimum salary \$550 thousand?

Problem 4. In 2010, the percentage of private-sector workers who were in a union was 6.95%, and it decreased by about 0.25 percentage points per year until 2014.

a) Find an equation of a model to describe the situation. Explain what your variables represent.

b) Estimate when the percentage of unionized workers was 6.20%.

c) Estimate the percentage of private-sector workers who were not in a union in 2014.

Problem 5. uberXL in Tucson charges a $2.50 base fare, a $2.05 booking fee and a per mile charge of $1.65. If I paid $18.41 for an uberXL trip, how far did I go?

Problem 6. The percentages of college freshmen whose average grade in high school was an A are shown below:

Year	Percent
1970	19.6
1980	26.6
1985	28.7
1990	29.4
1995	36.1
2000	42.9
2005	46.6
2010	48.4

Let p be the percentage of college freshmen whose average grade in high school was an A at t years since 1970.

a) Construct a scatterplot.

b) Describe the four characteristics of the association. (make sure to include r)

c) A model of the situation is $p = 0.76t_1 8.06$. Graph the model on the scatterplot (try to do this by hand!).

d) Does it come close to the data points?

e) Estimate when 44% of all college freshmen earned an average grade of A in high school.

f) Using the linear model predict the percentage of college freshmen that earned an average grade A in high school this year.

Problem 7. In 2013, the mean annual per-person consumption of butter was 5.5 pounds, up 12.2% from 2010. What was the mean annual per person consumption of butter in 2010?

Problem 8. Scientists are studying the effects of several factors on the growth of a certain species of tree. The diameter of this species of tree increases approximately 0.2 inches every six months. Scientists begin observing the trees when they are saplings, at which point they have an initial diameter of 0.3 inches. Using this information answer the following questions.

a) Write the general equation describing the relationship between the diameter of a given tree and the amount of time it has been observed by the scientists.

b) How long must scientists observe a given tree for it to grow a total diameter of 2.6 inches?

c) Circle all of the following statements which are consistent with the slope of the linear relationship defined above.

- The diameter increases 1 inch every year
- In 2 years, the diameter will increase 0.8 inches
- In order to see an increase in diameter of 1 inch, the scientists must observe for 2.5 years
- Over the course of 18 months, the diameter will increase 0.6 inches
- An increase in diameter of 0.5inches will occur in one month