**Quantitative Reasoning Linear Models, Scatterplots, Exponential Growth, Exponential Decay**

**Questions 1-3.** You invest $230 to start a sandwich stand and decide to charge $4.25 per sandwich.

1. Set up a Linear Model that determines your profit or loss based on the number of sandwiches.
2. How much money will you make if you sell 75 sandwiches? (round to the nearest cent).
3. How many sandwiches must you sell to make a $100 profit? (round to nearest sandwich)

**Questions 4-6.** A can of soda in 1972 costs $0.10, by 2012 it costs $1.25.

1. Find the rate at which the cost of a can of soda increase over this time period. (round to the hundred thousandth place).
2. Construct a linear model that can be used to predict the cots of soda. (round to the hundred thousandth place)
3. Use your linear model to predict the cost of a soda in 2014. (round to the nearest cent)

**Questions 7-11.** A scatterplot below was made using the annual CPI rate from 1960 to 2014. A trend line was added.



1. Use the trend line equation to estimate the CPI for 1980. (round to the hundredths place)
2. How does this value compare with the actual CPI for 1980? Use absolute or relative change in your answer.
3. Interpret the meaning of the slope of the trend line.
4. What is the linear correlation coefficient? (round to the ten thousandths place)
5. Should we use this model to predict CPI for 2030? Why or Why not?

**Questions 12-15.** A species of beetles grows 32% every year. Suppose 100 beetles are released into a field.

1. Construct an exponential model for this population.
2. How many beetles will there be in 10 years? (round to the nearest beetles)
3. How many beetles will there be in 20 years? (round to the nearest beetles)
4. About when will there be 100,000 beetles?

**Questions 16-18.** The landscaper pours 200 gallons of herbicide in a pond. The herbicide degrades 10% each week.

1. Write an equation to find the amount of herbicide in any given week.
2. How much will be in the pond after 1 week? (round to the nearest gallon)
3. The landscaper will put another dose in the pond when the herbicide level drops below 50 gallons. In about how many weeks will he need to add more herbicide?