Math 112 Written Homework: Rational Functions

Name: _____

Instructor: Taryn Laird

Math 112 Section: 006

Directions: Show all work, and answer each question that is asked. Explanations should be given in complete sentences. All graphs should be drawn accurately on this sheet, and be fully labeled.

1. A large mixing tank currently contains 105 gallons of water into which 5 pounds of sugar have been mixed. A tap will open pouring 15 gallons per minute of water into the tank at the same time sugar is poured into the tank at a rate of 1 pound per minute.

   Find the concentration (**pounds per gallon**) of sugar in the tank after 15 minutes.

   Is that a greater concentration than at the beginning?

   Let x represent the number of minutes that have passed since the water and sugar started getting poured into the tank.

Create an equation that represents the amount of sugar in the tank	Create an equation that represents the amount of water in the tank

   Write an equation that represents the concentration (**pounds per gallon**) of sugar in the tank after x minutes.

   Thinking about this problem in context name one constraint (real life restriction) that this problem would have that would affect the outcomes we could obtain from this equation.

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2. An oil company estimates that the cost, C, in dollars, of cleaning up x percent of an oil spill can be modeled by the equation $C = \frac{kx}{100-x}$, where $0 \leq x < 100$, and k is a constant. The company has data that indicates that spending \$300,000 will clean up 70% of an oil spill.

   Use this information to find the value of k.

   Using the k value you found above, what does the model predict the percentage of an oil spill that can be cleaned up if the company's budget is \$900,000.

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3. The manufacturer of the water toy "Silly Soaker" quotes a variable cost of $5.25 per unit and fixed costs of $7,000.

   Create a function to represent the average cost per unit to manufacture the Silly Soaker.

   Use the above model to determine the average cost per unit for a level of production of $x = 5{,}000$ units.

   What is the horizontal asymptote of this function, and what does it represent?