**AMDM Unit 4 Review**—Using Recursion in Modeling and Decision Making Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Pd\_\_\_\_

Show your work for all problems. On the test, NO WORK = NO CREDIT!

Vocabulary:

Bivariate data

Scatterplot

Association

Cause-and-effect (causation)

Linear

Non-linear

Form

Direction

Strength

Explicit form

Recursive form

Linear function

Exponential function

Exponential Growth

Exponential Decay

Common difference

Common ratio

Growth rate

Growth factor

Trigonometry

Sine function

Cosine function

Periodic function

Amplitude

Period

Circumference

1. Consider the three graphs below.

a) Compare and contrast the graphs below with regard to form, strength and direction.

 A B C



Time spent studying (hours per week)

Time spent playing video games (hours per week))

b) Of the three graphs, which could possibly have a cause-and-effect relationship between the variables? Why?

2. Describe the difference between an **association** and a **cause-and-effect** relationship and give an example of each.

3. Tell-All Phone Company charges a flat fee of $3.00 plus $0.20 per minute for international calls.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| L |  |  |  |  |  |  |  |  |  |  |
| C |  |  |  |  |  |  |  |  |  |  |

a) Let **L** represent the **length of the phone call** (in minutes) and **C** represent the **total cost of a call** (in dollars). Complete the table showing the cost of phone calls ranging from 0 to 9 minutes.

b) Which do the values in your table have, a common difference or a common ratio? What is it? What does this tell you about the type of function that would model the data?

c) Using the same variables from part (a), write a **recursive** function for the cost of a phone call lasting any number of minutes.

d) Using the same variables from part (a), write an **explicit** function for the cost of a phone call lasting any number of minutes.

e) Use your explicit function to predict the price of a 35-minute phone call.

f) What is the longest phone call you can make if you can spend up to $12?

4. Some studies show that each hour, the amount of caffeine remaining in your body is ***reduced*** by about 13%. Twelve ounces of Classic Coca-Cola has about 34 mg of caffeine.

a) What type of function best models this situation? (Make a table if that helps you answer the question)

b) Write a function that determines the amount of caffeine in your body after any number of hours.

c) If you drink a 12 oz. Coke at 3:00 pm, how much caffeine will be left in your body at 9:00 pm?

5. Assume that a basketball has a rebound percentage of 45%. Write both a **recursive** and **explicit** function to model the rebound height HN in terms of the bounce number N. You can represent the initial height as H0.

RECURSIVE: EXPLICIT:

6. Use one of your functions from #5 to find how high a basketball will bounce on the 6th bounce if it is dropped from a height of 25 feet. Explain why you chose the function you chose. Round your answer to the nearest hundredth.

7. a) Complete the table below.

|  |  |  |  |
| --- | --- | --- | --- |
| x | y | Difference ( ∆y) | Ratio (y2/y1) |
| 0 | 4.6 | ------------------------------- | ------------------------------- |
| 1 | 13.5 |  |  |
| 2 | 40.7 |  |  |
| 3 | 121 |  |  |
| 4 | 364.2 |  |  |
| 5 | 1094 |  |  |
| 6 | 3279.8 |  |  |

b) What type of function best models the data? Explain how you know.

c) Write a function to model the data.

8. The London Eye is a ferris wheel with a diameter of 120 meters and total height of 135 meters.

 a) Draw a sketch of this ferris wheel. Be sure to include labels and units.

 b) Find the circumference.

 c) If the wheel rotates at about 30 minutes per revolution, how many degrees will it rotate in 1 minute?

 d) How high off the ground will a capsule be after 2 minutes? After 5 minutes? After 20 minutes?