

Math 157 - Quiz 1

August 27, 2014

Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (2 points) When a person goes into shock, the cardiac output, in liters of blood per minute, decreases. A person's cardiac output is 12 liters per minute when she first goes into shock, and it decreases by 2 liters per minute for every hour that she is in shock. Find a formula for the cardiac output C as a function of t , the time in hours since first going into shock.

$$C(0) = 12$$

THIS TELLS US THE C IS A LINEAR FUNCTION WITH SLOPE -2 .

$$C = -2t + 12$$

2. (2 points) Could this data be representative of a linear function? Show work.

	1	2	5	7	15
x	1	2	5	7	15
y	14	12	6	2	-14
	-2	-6	-4	-16	

$$\frac{-2}{1} = \frac{-6}{3} = \frac{-4}{2} = \frac{-16}{8} = -2$$

CONSTANT RATE OF CHANGE \Rightarrow THE FUNCTION COULD BE LINEAR!

3. (2 points) Find the break-even point if the cost and revenue equations are $C = 130x + 12600$ and $R = 200x$, respectively.

COST = REVENUE

$$130x + 12600 = 200x$$

AT BREAK-EVEN

$$12600 = 70x$$

PT

$$x = 180 \Rightarrow C = R = 36000$$

$$(180, 36000)$$

4. (2 points) The world population is approximately $P = 6.4(1.0126)^t$, where P is in billions and t is in years since 2004.

(a) What is the yearly percent rate of growth of the world population?

$$r = 1.0126 - 1 = 0.0126$$

$$\Rightarrow \boxed{1.26\%}$$

(b) What does this model predict for the world population in 2010?

$$P(6) = 6.4(1.0126)^6 \approx 6.899$$

Approx 6.9 Billion

5. (2 points) Find the doubling time of a quantity that is growing exponentially at a rate of 7% per year.

↙

$$P(t) = P_0(1.07)^t$$

$$2P_0 = P_0(1.07)^t \Rightarrow 2 = (1.07)^t$$

$$\ln 2 = t \ln(1.07)$$

$$\frac{\ln 2}{\ln(1.07)} = t$$

Doubling Time is $\approx \boxed{10.245 \text{ yrs}}$