

HONOR 2201, CALCULUS FOR NON-SCIENCE MAJORS, QUIZ 1, 09/02/05

Name: Solution

Student ID #: _____

Each problem of #1-#3 is worth 5 points.

1. Determine the slope and the vertical intercept of the line given by $-4y + 2x + 8 = 0$.

$$-4y = -2x - 8$$

$$y = \frac{-2}{-4}x - \frac{8}{-4}$$

$$y = \frac{1}{2}x + 2$$

$$\Rightarrow \boxed{\text{slope} = \frac{1}{2}} \ \& \ \boxed{\text{the vertical intercept} = 2.}$$

2. Find a formula for the population $P(t)$ at time t in a town if the population at $t = 0$ is 2000 and increases by 3% a year.

$$r = 0.03. \quad \Rightarrow \quad a = 1 + r = 1.03. \quad \& \quad P_0 = 2000$$

$$\boxed{P(t) = 2000 \cdot (1.03)^t}$$

3. Find break-even-points when the cost function $C(q) = 10q - 100$ and the revenue function $R(q) = 500 - 20q$.

Find q when $C(q) = R(q)$.

$$\Rightarrow 10q - 100 = 500 - 20q$$

$$\Rightarrow 10q + 20q = 500 + 100$$

$$\Rightarrow 30q = 600$$

$$\Rightarrow q = 20.$$

$\boxed{\text{So break-even point is at } q = 20.}$

4. (Bonus problem, 1 pt) Determine whether the following statement is true or not.

If the average rates of change of the function $y = f(t)$ between $t = 0$ and $t = 1$, and between $t = 1$ and $t = 2$ are 3 and 2, respectively, then the graph of $y = f(t)$ between $t = 0$ and $t = 2$ is both increasing and concave down.

True

Why? Both rates of change are positive so the graph is increasing.

And the rate of change between 0 & 1 is 3 which is bigger than the next rate which is 2. So the rate of change is decreasing.

Then the graph is concave down.