Mathematics 122

Quiz #13 Name: Key

You must show your work to get full credit.

(1) Let $P(t)$ be given by the table

t	0	1	2	3
$P(t)$	1,000	1,500	2,250	3,375

2 pts (a) Explain why $P(t)$ can be an exponential function.

We have 3 ratios $\frac{P(t+1)}{P(t)}$. They are

$\frac{P(1)}{P(0)} = \frac{1500}{1000} = 1.5$, $\frac{P(2)}{P(1)} = \frac{2,250}{1,500} = 1.5$, $\frac{P(3)}{P(2)} = \frac{3,375}{2,250} = 1.5$

The ratios are constant, so it is an expo fcn.

1 pt (b) Give a formula for $P(t)$

$P(t) = P_0 a^t$

$= 1,000(1.5)^t$

$P(t) =$ $1,000(1.5)^t$

(2) Let $y = f(x)$ be given by

x	2.0	2.4	2.8
$f(x)$	5.6	4.4	3.2

We wish to estimate $f(2.48)$.

1 pt (a) Since 2.48 is between 2.4 and 2.8 we should use the quotient

$$\frac{\Delta y}{\Delta x} = \frac{3.2 - 4.4}{2.8 - 2.4}$$

as our estimate for the derivative. Give a sentence explaining why.

Because this uses the information closest to what we are trying to estimate.

1 pt (b) Given an estimate for $f(2.48)$

using

$f(2.48) \approx$ 4.16

$f'(2.4) \approx \frac{3.2 - 4.4}{2.8 - 2.4} = \frac{-1.2}{.4} = -3$

$f(2.48) \approx f(2.4) + f'(2.4)(2.48 - 2.4)$

$= 4.4 - 3(.08)$

$= 4.16$