© Scarborough Math 131 Fall 2007 Quiz 2 KEY

(20pts) NAME (printed neatly): _____

(10pts) Section Number (circle correct section): 502 (10:20am) 503 (11:30am) 506 (4:10pm)

Quiz Grade: _____

1. The table shows the relationship between the number of items sold and the number of items produced.

Thousands of items produced	25.999	31.659	33.304	33.570	35.239	**L1**
Number of items sold	1000	5300	8600	9300	15200	**L2**

a. (12pts) Find the model for the data.

Two possible models (just need one).

QuadReg L1, L2, Y1

The number of items sold is
$n(x) = 228.2647963x^2 - 12467.97342x + 170891.5818$ when x is thousands of items produced for $25.999 \leq x \leq 35.239$.

ExpReg L1, L2, Y1

The number of items sold is $f(p) = 0.4726413531\ (1.342489311^p)$ when p is thousands of items produced for $25.999 \leq p \leq 35.239$.

b. (10pts) Use the model to estimate the number of items sold if 30000 items were produced.

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n(30) = 2290.695968

When 30000 items are produced, we predict about 2291 (or 2290) items will be sold.
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f(30) = 3249.801349

When 30000 items are produced, we predict about 3250 (or 3249) items will be sold.

2. In 2000, Money Hog had approximately 3.8 million dollars of assets in customer accounts, and since then the value has grown approximately 21.3% each year.

a. (16pts) Find a model for Money Hog's customer account assets since 2000.

$f(x) = a\,b^x$ where a is the initial amount and $(b - 1)100\%$ is the percentage change.
$(b - 1)100\% = 21.3\%$
$b - 1 = 0.213$
$b = 1.213$

The amount of money Money Hog had in the account is $A(t) = 3.8\,(1.213^t)$ million dollars for t years since 2000 for $t \geq 0$ [or $0 \leq t \leq 6$ (since the year 2007 is not over)].

b. (10pts) Use the model to estimate Money Hog's customer account assets in 2010.
A(10) = y1(10) = 26.205449

The amount predicted that Money Hog would have in 2010 is $26205449.

3. The population of bacteria in a Petri dish is given.

Time in hours	0	1	2	3	4	5	6	**L1**
Population in hundreds	1.92	6.15	16.59	32.27	44.25	49.51	51.26	**L2**

a. (12pts) Find the best model p(t) for the data.

Logistic L1, L2, Y1

The bacteria population in the Petri Dish is $p(t) = \dfrac{51.99349598}{1 + 26.03046281\ e^{-1.250552606t}}$ hundred bacteria for t hours from the initial population, $0 \leq t \leq 6$.

b. (10pts) Find and interpret $\lim_{x \to \infty} p(t)$.

$$\lim_{x \to \infty} p(t) = 51.99349598$$

The limiting population of bacteria in the Petri dish is about 5199 bacteria.