Math 222

Chapter 3-4 Exam Name:_____

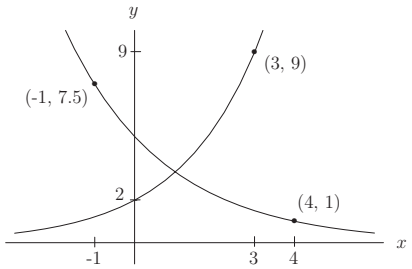
You may use a calculator to verify solutions, but not to provide them.

Show all relevant work!

8pts 1. A mortgage company advertises that they are offering a 30 year fixed rate loan at a nominal rate of 6.75%. Assuming the loan is compounded monthly, what is the equivalent annual interest rate (simple interest) of the loan?

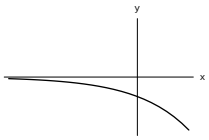
12pts 2. Suppose $P_1(t) = 23.8 + 0.18t$, $P_2(t) = 23.8(1.18)^t$, and $P_3(t) = 23.8e^{0.18t}$ are population models for three different towns giving population in thousands of people as a function of time in years since 1950. Describe the behavior of each model in terms of starting population and growth rate.

12pts 3. Determine the point of intersection of the two exponential functions graphed below.



8pts 4. Give a *possible* equation of the form $y = a \cdot b^x$ for each graph.

(a)



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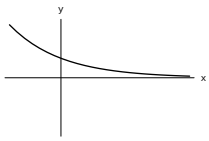
(b)



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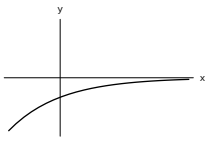
(c)



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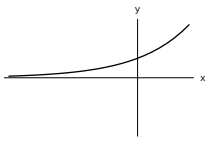
(d)



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5. The number of asthma sufferers in the world was about 84 million in 1990 and 130 million in 2001. Let N represent the number of asthma sufferers (in millions) worldwide t years after 1990.

7pts (a) Write N as a linear function of t.
What is the slope and what does it tell you about the number of asthma sufferers over time?

7pts (b) Write N as an exponential function of t.
What is the growth factor and what does it tell you about the number of asthma sufferers over time?

4pts (c) How many asthma sufferers are predicted world wide in the year 2010 with the linear model? _____

With the exponential model? _____

4pts 6. Simplify the expression $e^{x \ln x}$.

7. Radioactive strontium-90 has a half-life of 29 years.

(a) Write a formula giving the quantity of strontium-90 as a function of time in years.

6pts

(b) What is the continuous rate of decay?

2pts

(c) Use your formula to help you determine how long it will take before only 12% of the element remains.

6pts

8. Suppose $f(x)$ is quadratic, $g(x)$ is exponential of the form $y = a \cdot b^x$, and $h(x)$ is linear. Complete each of the tables below to match these functions.

12pts

x	1	2	3	4	5
$f(x)$	3				

x	1	2	3	4	5
$g(x)$	3				

x	1	2	3	4	5
$h(x)$	3				