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Math 100 Section E/F – Exam 3
April 10, 2007

1. Rewrite the formula $y = \frac{8}{x^2}$ taking the logarithm of both sides (you may assume $x > 0$).

2. Rewrite the formula $y = (1.3)7^x$ taking the logarithm of both sides.

3. If $\log(a) = 1.2$ and $\log(b) = -3.1$, what is $\log\left(\frac{\sqrt{a}}{b^3}\right)$?

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4. Solve $e^{3x+2} = 1$.

5. Solve $3\log(2x - 10) + 6 = 9$.

6. What is the domain of the function $f(x) = \log(6 + 4x) + 1$?

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7. What is the future value in 6 years of an initial investment of \$100,000 at an annual interest rate of 6% compounded twice per year?

8. A company's sales decay after an advertising campaign according to the model $S = 50,000e^{-0.08x}$, where x is the number of weeks after the campaign ended. How many weeks after the campaign ends will it take for sales to fall to \$22,500?

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9. The magnitude of an earthquake is expressed on the Richter scale. The Richter scale is $R = \log\left(\frac{I}{I_0}\right)$, where I_0 is a minimal intensity and I is the measured intensity.

(a) If an earthquake has an intensity of $10,000I_0$ what is its magnitude?

(b) How much does the magnitude increase if the intensity is 10 times larger than the intensity from part (a)?

10. Find all real and complex solutions to $x^3 + x^2 - 4x - 24 = 0$, given that one solution is $x = 3$.

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11. Let $R(x) = x^3 + x^2 - 24x$. Then $R(2) = -36$. For what other values of x is $R(x) = -36$?

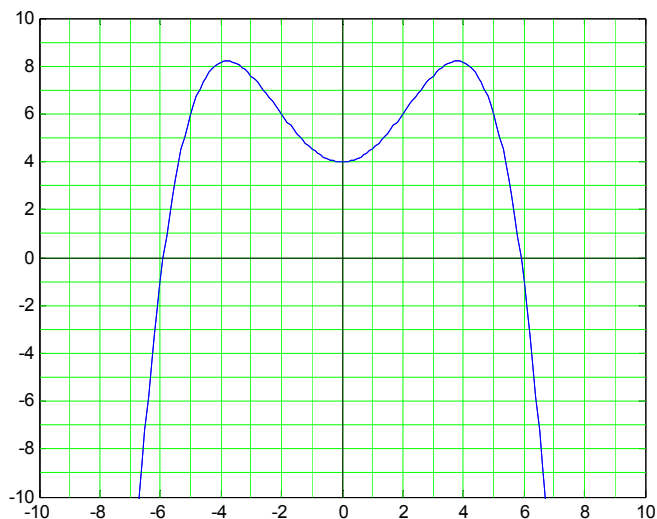
12. What is a polynomial with single roots at $x = 3$ and $x = -2$, and a double root at $x = 1$? Write the polynomial in standard form (e.g. $a_n x^n + \dots + a_1 x + a_0$) for full credit.

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13. Find all real and complex solutions to $x^4 - 25x^2 + 60x - 36 = 0$; given that two solutions are $x = -6$ and $x = 1$. (Be sure to read the polynomial carefully, it is 4th degree with no cubic term).

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14. Answer the following questions about the polynomial graphed at the right. You may assume nothing interesting happens outside the window shown.



How many real roots does the polynomial have?

How many turning points?

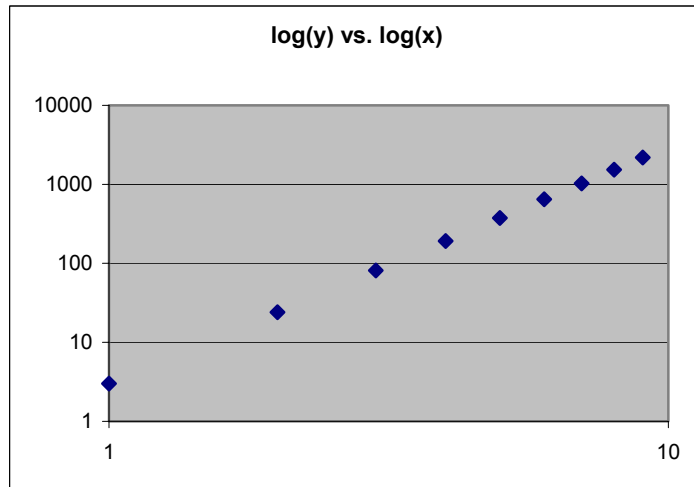
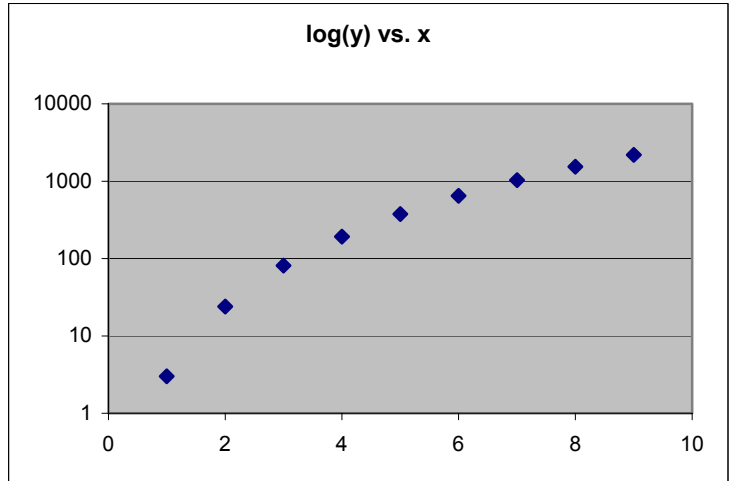
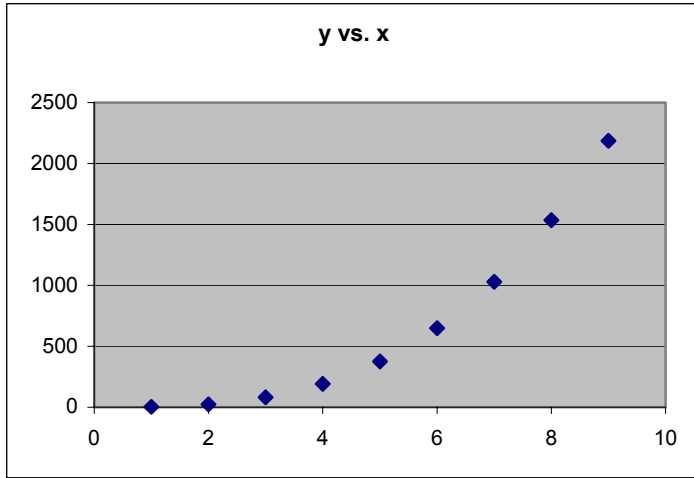
Is the leading coefficient positive or negative?

Is the constant term positive or negative?

The least possible degree of this polynomial is?

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15. A data set is plotted below on standard, semi-log, and log scales. What type of function would be best for modeling this data? Explain your reasoning.



Name: _____

Pledge:

On my honor, as a student, I have neither given nor received unauthorized aid on this

examination: _____

(signature)

(date)