Math 141 Exam 3 Name_____

11/3/17 [/50]

Show all your work for full credit. Unsupported answers = reduced points. **Please use a pencil.**

1. Find the following values **without** a calculator (0 points with a calculator). **Show your work for credit.**

a) $\log_3\left(\sqrt[7]{3}\right)$

[/3]

b) $\log_2(3) - \log_2(48)$

[/3]

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b) $\log_6(4) + 2\log_6(3)$

[/3]

c) $9^{\log_3(2/3)}$

[/3]

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2. Use the properties of logarithms to completely expand the expression:

$$\log_5\left(\frac{\sqrt{x}}{2(x+1)^2}\right)$$

[/3]

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3. Use the properties of logarithms to write the expression as a single log:

$$\frac{1}{2}\log(4) - \log(x+1) + 2\log(x) - 4\log(y)$$

[/3]

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4. Find an inverse function for f, and give the range and domain of the inverse:
$f(x) = 2\log_3(x+5)$

[/5]

5. Find all solutions to the equation. Give the exact value and approximated to 4 decimal places.
$160\,e^{0.034x} - 38 = 53$

[/5]

6. Find all the solutions to the equation:
$\log_2(6-x) = 5 - \log_2(2-x)$

[/5]

7. Solve the equation: $3^{4x-2} = 5^x$. Give the exact solution and approximated to four decimal places.

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8. Solve the equation: $2^{2x} - 3 \cdot 2^x - 6 = 0$. Give the exact value and approximated to four decimal places.

[/5]

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9. An experimental material used for coffee cups claims to keep coffer “hot for one hour”. Coffee served in this cup at 198˚ *F* cools to 182˚ *F* after five minutes in a room that is 72˚F. Find a model for the temperature of the coffee at any time *t*. Use your model to determine the temperature after one hour (Round to two decimal places). Is it greater than 100˚ *F*? Recall: $T(t) = (T_0 - T_s)\, e^{-k\,t} + T_s$

Model: Temperature: [/5]

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10. A stock, currently valued at $12 per share is expected to increase 70% every 5 years. Find an exponential model $V = V_0\, b^{t/k}$ for the value of the stock, and estimate when the value will be $40. Round to two decimal places.

Model: Estimate: [/5]
