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Math 120 ALC Sections

Mastery Exam Practice 3

Your Name _____

Instructor's Name _____

Directions:
a. No books, notes, or calculators allowed.
b. Do all problems in the spaces provided.
c. All problems count equally.
d. Give explanations and show calculations.
e. Circle your answers.

Score

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____

Total _____

1. Compute the derivative of $f(x) = 1/x$ using the definition of the derivative.

2. Find an equation of the tangent line to the curve $y = 3x^2 - 5x + 2$ at the point where x = 1.

3. a. Given $\log_{10} 2 \approx .301$, find $\log_{10} 8$.

b. Find $\sin(-\pi/4)$.

4. Let $f(x) = 5e^x + 2$.
   a. Find a formula for f^{-1}.
   b. What is the domain of f^{-1}? Explain.

5.

$$\text{Find } \frac{d}{dx}\left\{\cos(2x)\ln(5x)\right\}.$$

6.

$$\text{Find } \frac{d}{dt}\left\{\frac{6\sin t + 5^t}{3t}\right\}.$$

7.

$$\text{Find } \frac{d}{dx}\left\{e^{(\cos x + x^3)} - x^4\right\}.$$

8. Sketch a graph of
$g(x) = 1 - 2\sin(2x)$
Indicate the scale on
both the x and y axes.
Show at least one full period.

9. Let $f(x) = 3(x-1)^3 + 1$.
   a. Determine the set of points x on which f is increasing.

   b. Determine the set of points x on which f is concave up.

10. Find the equation of the tangent line to $\ln(xy) + x^3 y = 1$ at the point $(1, 1)$.

11. Suppose $f(1) = 4$ and $f'(x) \geq 1$ for all x. If $g(x) = x^2 f(2x)$ is $g'(1) \geq 12$? Explain.