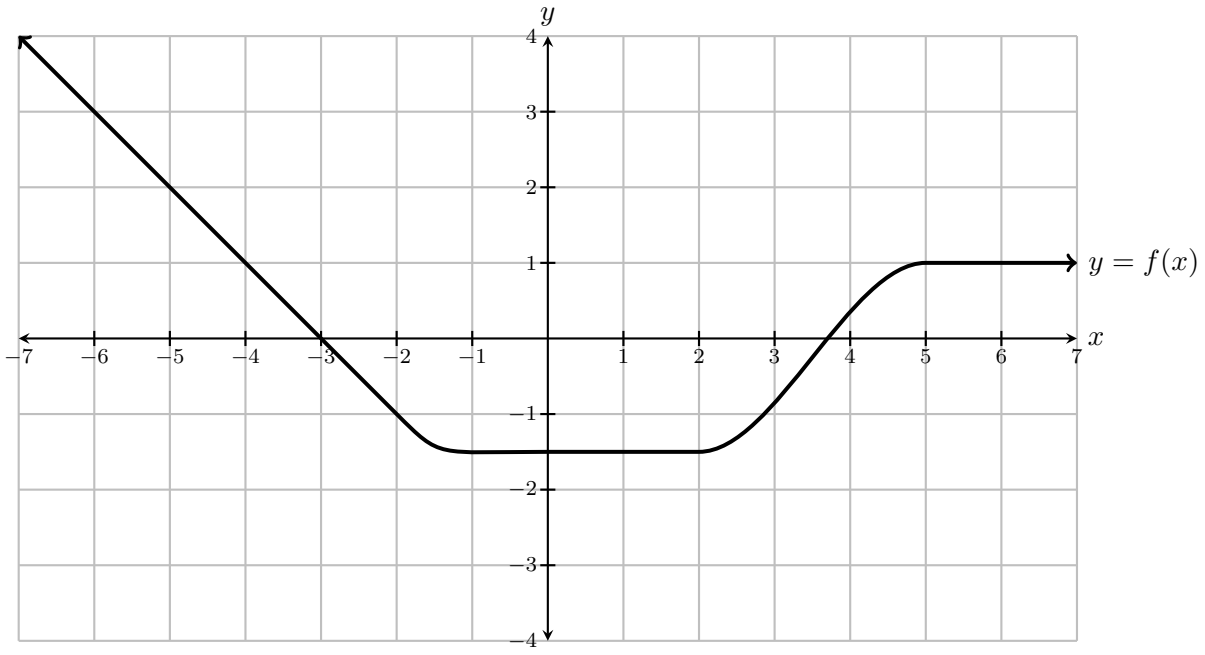
Name: _____ MATH 200 – TEST 2 ●

I'm in the Thurs11 Thurs12 Thurs1 or Fri10 recitation (Circle one) October 15, 2012

1. (10 pts.) The graph of a function $f(x)$ is shown. Using the same coordinate axis, sketch the graph of $y = f'(x)$.



2. (10 pts.) Find all points (x, y) on the graph of $y = x + \dfrac{1}{x-3}$ where the tangent line is horizontal.

3. (14 pts.) Find the indicated derivatives.

(a) $f(\theta) = 5 + \ln(\pi\theta) + \sqrt{\theta^3}$

$f'(\theta) =$

$f''(\theta) =$

(b) $\dfrac{d}{dx}\left[\dfrac{x}{x^3 + x^2 + 1}\right] =$

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4. (21 pts.) Find the indicated derivatives.

(a) $\dfrac{d}{dx}\left[\, e^{4x}\sqrt{3x+1}\,\right] =$

(b) $\dfrac{d}{dx}\left[\, \ln\left(\sec(x^3)\right)\,\right] =$

(c) $\dfrac{d}{dx}\left[\, \tan^{-1}\left(\pi x\right)\,\right] =$

5. (10 pts.) Consider the equation $x\sin(y) = y^3$. Use implicit differentiation to find $\dfrac{dy}{dx}$.

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6. (10 pts.) Use logarithmic differentiation to find the derivative of $f(x) = x^{\cos(x)}$.

7. (10 pts.) This problem concerns a rock that is thrown off a tower at time $t = 0$. At time t (in seconds) it has a height of $s(t) = 48 + 32t - 16t^2$ feet. Please show your work in answering the following questions.

   (a) When does the rock hit the ground?

   (b) What is its velocity when it hits the ground?

8. (7 pts.) Simplify: $\sec\left(\cos^{-1}(x)\right) =$

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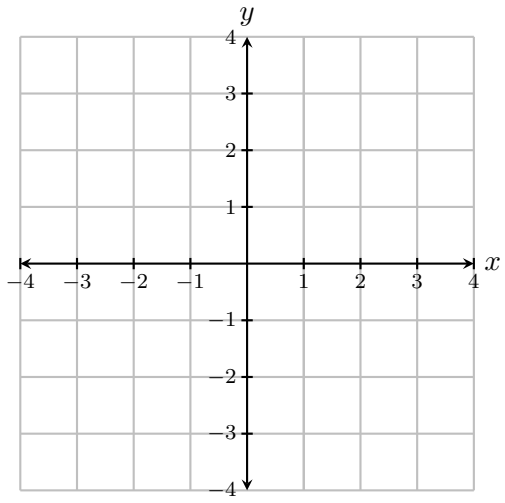
9. (4 pts.)

   (a) If $f(x) = e^x$, then $f^{-1}(x) =$ _____.

   (b) Carefully graph $f(x)$ and $f^{-1}(x)$ below.



10. (4 pts.)

   (a) Graph the function $g(x) = x^2 - 1$ below.

   (b) Now carefully graph the derivative $g'(x)$.