

Name: _____

Instructor: _____

Math 10560, Quiz Tutorial 1
January 24, 2017

- The Honor Code is in effect for this quiz. All work is to be your own.
- No calculators.
- The quiz lasts for 25 Minutes .
- Be sure that your name is on every page in case pages become detached.
- Be sure that you have all 4 pages of the test.

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|---|-----|-----|-----|-----|-----|
| PLEASE MARK YOUR ANSWERS WITH AN X, not a circle! | | | | | |
| 1. | (a) | (b) | (c) | (d) | (e) |
| 2. | (a) | (b) | (c) | (d) | (e) |
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| 3. | (a) | (b) | (c) | (d) | (e) |
| 4. | (a) | (b) | (c) | (d) | (e) |
| | | | | | |
| 5. | (a) | (b) | (c) | (d) | (e) |

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Multiple Choice

1.(6 pts) The function

$$f(x) = 4 + 2x + \ln(x)$$

is a one-to-one function (there is no need to check this). What is $(f^{-1})'(6)$?

- (a) $\frac{1}{3}$ (b) $\frac{1}{7}$ (c) 3 (d) $\frac{3}{2}$ (e) $\frac{1}{2}$

2.(6 pts) Use logarithmic differentiation to compute the derivative of the function

$$y = \frac{2^x(x^3 + 2)}{\sqrt{x - 1}}.$$

- (a) $\frac{dy}{dx} = \frac{\ln 2}{2} \left[\frac{2^x(x^3 + 2)}{\sqrt{x - 1}} \right] \left[\frac{(3x^2)(x - 1)}{x^3 + 2} \right]$
- (b) $\frac{dy}{dx} = \left[\frac{2^x(x^3 + 2)}{\sqrt{x - 1}} \right] \left[\frac{x + \ln(x^3 + 2)}{\ln(\sqrt{x - 1})} \right]$
- (c) $\frac{dy}{dx} = \ln 2 + \frac{3x^2}{x^3 + 2} - \frac{1}{2(x - 1)}$
- (d) $\frac{dy}{dx} = \frac{2^x(x^3 + 2)}{\sqrt{x - 1}} \left[\ln 2 + \frac{3x^2}{x^3 + 2} - \frac{1}{2(x - 1)} \right]$
- (e) $\frac{dy}{dx} = \frac{2^x(x^3 + 2)}{\sqrt{x - 1}} \left[\frac{(2^{x+1} \ln 2)(3x^2)\sqrt{x - 1}}{(x^3 + 2)} \right]$

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3.(6 pts) Compute the integral

$$\int_1^5 \frac{1}{(1+x^2)\tan^{-1}(x)} dx.$$

- (a) $\ln(\pi/3) - \ln(\pi/4)$
- (b) $\ln(\tan^{-1}(5))$
- (c) $\ln(\tan^{-1}(5)) - \ln(\pi/4)$
- (d) $-\ln(\tan(5))$
- (e) $\frac{\ln(5)}{2}$

4.(6 pts) Find the derivative of $(x^2 + 1)^{x^2+1}$.

- (a) $(x^2 + 1)^{x^2+1} 2x(\ln(x^2 + 1) + 1)$
- (b) $(x^2 + 1)^{x^2+1} (2x \ln(x^2 + 1))$
- (c) $2x(x^2 + 1)^{x^2}$
- (d) This function is not defined and hence has no derivative.
- (e) $(x^2 + 1)^{x^2+1}$

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5.(6 pts) Which of the following is true about $y = f(x) = x \ln(x)$, $x > 0$.

- (a) The function is increasing for all x and concave up for all $x > 0$
- (b) The function is decreasing for $0 < x < e$, increasing for $x > e$, and concave up for all $x > 0$
- (c) The function is concave down for all $x > 0$
- (d) The function is decreasing for $0 < x < \frac{1}{e}$, increasing for $x > \frac{1}{e}$, and concave up for all $x > 0$
- (e) The function is decreasing for $0 < x < 1$, increasing for $x > 1$, and concave up for all $x > 0$

The following is the list of useful trigonometric formulas:

$$\sin^2 x + \cos^2 x = 1$$

$$1 + \tan^2 x = \sec^2 x$$

$$\sin^2 x = \frac{1}{2}(1 - \cos 2x)$$

$$\cos^2 x = \frac{1}{2}(1 + \cos 2x)$$

$$\sin 2x = 2 \sin x \cos x$$

$$\sin x \cos y = \frac{1}{2}(\sin(x - y) + \sin(x + y))$$

$$\sin x \sin y = \frac{1}{2}(\cos(x - y) - \cos(x + y))$$

$$\cos x \cos y = \frac{1}{2}(\cos(x - y) + \cos(x + y))$$

$$\int \sec \theta = \ln |\sec \theta + \tan \theta| + C$$

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