Practice test 2

1) Derivative formulas

a) $\frac{d}{dx}[\sin(x)] =$ _____

b) $\frac{d}{dx}[e^x] =$ _____

c) $\frac{d}{dx}[\ln(x)] =$ _____

d) $\frac{d}{dx}[x^n] =$ _____

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2) Are the following indeterminate forms? If not, write their value. (or $\pm\infty$).

a) $\infty^{\infty} =$ _____

b) $0^0 =$ _____

c) $\infty - \infty =$ _____

d) $\frac{0}{\infty} =$ _____

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3) Find y' (or $\frac{dy}{dx}$).

a) $y = (x^4 - 4x^2 + 5)^3$

b) $y = \frac{t}{1-t^2}$

c) $y = \frac{e^{1/x}}{x^2}$

d) $y = (\arcsin(2x))^2$

e) $y = \ln(x^2 e^x)$

f) $\sin(xy) = x^2 - y$

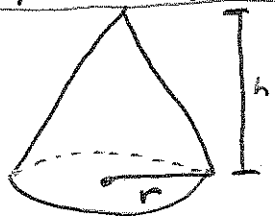
g) $y = \frac{(x^2+1)^4}{(2x+1)^3(3x-1)^5}$

h) $y = e^{\cos(x)} + \arctan(\arcsin(x))$

4) Find the equation of the line tangent to

$x^2 + 4xy + y^2 = 13$ at the point $(2, 1)$

5)



The volume of a right circular cone is $V = \frac{\pi r^2 h}{3}$.

a) If the radius is constant at 3 metrs and the height is increasing at a rate of 2 metrs per minute, how fast is the volume increasing when the height is 5 metrs?

b) If the height is constant at 5 metrs, and the radius is increasing at a rate of 2 metrs per second, how fast is the volume changing when the radius is 3 metrs?

6) Find the absolute max and min of the function on the given interval

a) $f(x) = 3x^2 - 12x + 5$ on $[0, 3]$.

b) $f(x) = \frac{x}{x^2+1}$ on $[0, 2]$

c) $f(x) = x e^{-\frac{x^2}{8}}$ on $[-1, 4]$.

7) For $f(x) = x^3 + x - 1$ on $[0,2]$,

Find all the numbers that satisfy the conclusion of the Mean Value Theorem.

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8) Find the following Limits

a) $\lim_{x \to 1} \frac{x^2-1}{x^2-x}$

b) $\lim_{x \to \infty} \frac{x^2-1}{x^2-x}$

c) $\lim_{t \to 0} \frac{e^{3t}-1}{t}$

d) $\lim_{x \to \infty} \frac{\ln(\ln(x))}{x}$

e) $\lim_{x \to -\infty} x^2 e^x$

f) $\lim_{x \to \infty} (x - \ln(x))$

g) $\lim_{x \to 0^+} (4x+1)^{\cot(x)}$

h) $\lim_{x \to 0^+} (\tan(2x))^x$

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9) Find the domain, intercepts, asymptotes, critical points, intervals of increase, decrease, inflection points, and concavity, and local maximums and minimums. Use this to sketch the graph.

a) $y = x^3 + 6x^2 + 9x$

b) $y = \frac{x^2-4}{x^2-2x}$

c) $y = xe^x$

d) $y = \ln(4-x^2)$