

Math 105 A/B  
Exam 2  
November 7, 2014  
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1) Find the derivative for each of the following:

a)  $f(x) = \cos(\sqrt{x})$

b)  $g(x) = \arctan(3x)$

c)  $h(x) = \ln\left(\frac{\sin(x)}{x}\right)$

2. Find an equation of the tangent line to the graph  $x^{2/3} - y^{2/3} - y = 1$  at the point (1,-1).

3. Evaluate the following limits:

a)  $\lim_{x \rightarrow 0} \frac{e^{2x} - 1}{\sin(x)}$

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

c)  $\lim_{x \rightarrow \infty} \frac{cx^{m-3}}{dx^{n+5}}$  if  $m > n > 0$ .

4. Find an antiderivative of  $f(x) = \frac{2}{1+4x^2} + \sec^2(x) + \pi$

5. Rewrite the following expression as an algebraic expression.

$$\sin(\arctan(x))$$

6. Consider the function  $f(x) = xe^x$ .

a) Using calculus, find the x-value(s) of all critical points.

b) Using calculus, identify each critical point as a local max, local min, or neither.

c) Using calculus find the x-value(s) of all points of inflection.

7. A rectangular plot of land is to be fenced in using two kinds of fencing. Two opposite sides will use heavy-duty fencing selling for \$3 a foot, while the remaining two sides will use standard fencing selling for \$2 a foot. Using calculus, find the dimensions of the rectangular plot of greatest area that can be fenced in at a cost of \$6000.

8. If  $f(x) = x^3 - 2x - 1$ , find  $(f^{-1})'(3)$ .