MATH 1131 – Calculus I

Practice Exam 2

No calculators. Show your work. Clearly mark each answer.

1. Find the equation of the tangent line at point $(1, 2)$ for $y^3 + x^2 = 2$.

2. Evaluate the following limits:

   (a)
   $$\lim_{x \to 0} \frac{\tan(3x)}{5x}$$

   (b)
   $$\lim_{x \to 0} \frac{\sin(5x)}{\sin x}$$

   (c)
   $$\lim_{x \to 0} \frac{(\cos x - 1)(x + 1)}{2x}$$

   (d)
   $$\lim_{x \to 0} \frac{e^x - 1}{2x}$$

3. Use logarithmic differentiation to compute $f'(x)$ for

   $$f(x) = \frac{\sqrt[4]{x^2 + 1}}{(x^2 + 10)\sqrt[3]{x^3 + 1}}$$

4. Compute $f'(x)$ for

   (a)
   $$f(x) = (x^3 - 10x)^3(x^2 + 1)^2$$

   (b)
   $$f(x) = \frac{\sqrt{x} + 1}{x + 1}$$

   (c)
   $$f(x) = \tan^{-1}(x^2)$$

   (d)
   $$f(x) = \sin^{-1}(x^2 + 1)$$

   (e)
   $$f(x) = x^{x^2}$$

5. A square initially has dimensions 2 in by 2 in. All sides begin increasing in length at a rate of 1 in/sec. At what rate is the area of the square increasing after 10 sec?