Name: MATH 241 §004

Quiz 0: Calculus Preliminaries

Complete the following problems to the best of your ability. Show all of your work. If you think you might have an idea what you should do but you've forgotten how to do it, let me know. You may not use a calculator.

1. Explain in your own words the definition of the following concepts.

   (a) Function

   (b) The derivative of a function at a point (there are a few possible answers for this, list as many as you can think of)

   (c) The indefinite integral of a function

   (d) The definite integral of a function over an interval (what does this get us in the context of the function itself?)

   (e) Critical points of a function

   (f) Local and Global extrema of a function

2. Calculate the following derivatives and integrals. You don't need to simplify.

(a) $\frac{d}{dx}\left((x^3+4)^4\right)$

(b) $\frac{d}{dx}\left(\frac{2^x}{sin(x)}\right)$

(c) $\int_0^1 x^3 e^{x^4} dx$

(d) $\int x\cos(x)dx$

(e) $\int \frac{dx}{\sqrt{4+x^2}}$

3. Find all local extrema for the function $f(x) = 2x^3 + 3x^2 - 36x + 4$.

4. Come up with a pair of functions $x(t)$ and $y(t)$ that parameterise the line $y = 2x$ from the origin to the point $(2, 4)$.

5. How do Polar Coordinates work? What is the point $(0, 3)$ in polar coordinates?

6. What was your most hated part of calc 1 or 2? What about your least?