

Name Dylan Zwick Date 5/19/09

Instructions: Please show all of your work as partial credit will be given where appropriate, **and** there may be no credit given for problems where there is no work shown. All answers should be completely simplified, unless otherwise stated.

1. Find the slope of the curve $y = 2x^4 - 5x^3 + 3x + 6$ at the point where $x = 1$. (5 pts)

$$y' = 8x^3 - 15x^2 + 3$$

$$y'(1) = 8(1^3) - 15(1^2) + 3 \\ = 8 - 15 + 3 = -4$$

Answer 1: -4

2. Evaluate the integral $Y = \int (x^2 - 5) dx$ such that (5 pts)
 $Y = 2$ when $x = 0$.

$$\int (x^2 - 5) dx = \frac{x^3}{3} - 5x + C$$

$$Y(0) = \frac{0^3}{3} - 5(0) + C = 2 \\ \Rightarrow C = 2$$

Answer 2: $\frac{x^3}{3} - 5x + 2$

3. Find each of these limits or state that the limit does not exist. (Hint: Factor the polynomials)

(a) $\lim_{x \rightarrow 3} \frac{\sqrt{(x+5)(x-3)^4}}{(3x-9)^2}$ (3 pts)

$$\lim_{x \rightarrow 3} \frac{\sqrt{(x+5)(x-3)^4}}{(3x-9)^2} = \lim_{x \rightarrow 3} \frac{\sqrt{(x+5)} (x-3)^2}{3^2 (x-3)^2} = \lim_{x \rightarrow 3} \frac{\sqrt{(x+5)}}{9} \\ = \frac{\sqrt{8}}{9} = \frac{2\sqrt{2}}{9}$$

Answer 3(a): $\frac{2\sqrt{2}}{9}$

2 (b) $\lim_{x \rightarrow 2} \frac{-x^3 + 5x + 1}{x^2 - 7x + 11}$ (2 pts)

Plug in $x = 2$

$$\frac{-(2)^3 + 5(2) + 1}{(2)^2 - 7(2) + 11} = \frac{3}{1} = 3$$

Answer 3(b): 3