

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. (a) Find the equation of the line that goes through the points (2, -4) and (-1, 5).

$$m = \frac{5 - (-4)}{-1 - 2} = \frac{9}{-3} = -3$$

$$(y - 5) = -3(x - (-1)) \Leftrightarrow \boxed{y = -3x + 2}$$

Answer 1(a): $y = -3x + 2$

- (b) Find the equation of the line that's perpendicular to $x = 4$ and goes through the point (-2, 5).

A vertical line is perpendicular to a horizontal line. So, $y = 5$ is the answer.

Answer 1(b): $y = 5$

2. Use the definition of the derivative $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ to find $f'(x)$ for $f(x) = x^2 + 2x - 5$.

$$\lim_{h \rightarrow 0} \frac{(x+h)^2 + 2(x+h) - 5 - (x^2 + 2x - 5)}{h}$$

$$= \lim_{h \rightarrow 0} \frac{x^2 + 2xh + h^2 + 2x + 2h - 5 - x^2 - 2x + 5}{h}$$

$$= \lim_{h \rightarrow 0} \frac{2xh + h^2 + 2h}{h} = \lim_{h \rightarrow 0} 2x + h + 2 = \boxed{2x + 2}$$

Answer 2: $2x + 2$

3. Find the derivative of $y = 2x^7 - 3x^4 + x^3 - 8x + 9$ (You can use the shortcut here. :))

$$y' = 14x^6 - 12x^3 + 3x^2 - 8$$

Answer 3: $14x^6 - 12x^3 + 3x^2 - 8$