Math 220 (section ???) Quiz 4 Spring 2010

Name Solutions

You have 13 minutes for this quiz – no calculators allowed.

1. (2 points each) Obtain derivatives for each of the following functions. Your final answer should be an equation. The left side should use proper notation for the derivative and the right side should use correct variables in your derivative formula.

   (a) $g(t) = t^5 - 4t^3 + 9t^2 - 10$

   $$g'(t) = 5t^4 - 4(3t^2) + 9(2t) - 0$$

   $$g'(t) = 5t^4 - 12t^2 + 18t$$

   (b) $y = \left(2x - 5\sqrt{x}\right)^2 = (2x)^2 + 2(2x)(-5\sqrt{x}) + (-5\sqrt{x})^2$

   $$= 4x^2 - 20x^{3/2} + 25x$$

   $$\frac{dy}{dx} = 4(2x) - 20\left(\tfrac{3}{2}x^{1/2}\right) + 25$$

   $$\frac{dy}{dx} = 8x - 30x^{1/2} + 25$$

   or with chain rule,

   $$\frac{dy}{dx} = 2(2x - 5\sqrt{x}) \cdot (2x - 5\sqrt{x})'$$

   $$= 2(2x - 5\sqrt{x}) \cdot \left(2 - \tfrac{5}{2}x^{-1/2}\right)$$

(c) $f(x) = \dfrac{e^3}{\ln(829\pi)}$

$f'(x) = 0$ since $\dfrac{e^3}{\ln(829\pi)}$ is a constant

2. (4 points) Find the equation of the line which is tangent to the curve $y = x^2 - 2x - 15$ at its positive x-intercept.

To find the x-intercept, set $y=0$

$0 = x^2 - 2x - 15$

$0 = (x-5)(x+3)$

$x = 5$ or $x = -3$

pos. x-int $\Rightarrow x = 5$

Point: $(5, 0)$

$y' = 2x - 2$

$y'(5) = 2 \cdot 5 - 2 = 8$

Slope: 8

$y - 0 = 8(x-5)$

$y = 8x - 40$