Name Answer Key

Period _____ Date _____

Sec 3.1 and 3.2 Review Worksheet

Differentiate.

1. $f(x) = x^2 - 10x + 100$

$2x - 10$

2. $s(t) = t^8 + 6t^7 - 18t^2 + 2t$

$8t^7 + 42t^6 - 36t + 2$

3. $F(x) = (16x)^3$ $= 16^3 x^3$

$4096x^3$

$12288x^2$

4. $G(y) = (y^2 + 1)(2y - 7)$

$2y^3 - 7y^2 + 2y - 7$

$G'(y) = 6y^2 - 14y + 2$

5. $h(x) = \frac{x+2}{x-1}$

$\frac{(x-1) + (x+2)}{(x-1)^2}$

$\frac{-3}{(x-1)^2}$

6. $G(s) = (s^2 + s + 1)(s^2 + 2)$

$s^4 + 2s^2 + s^3 + 2s + s^2 + 2$

$s^4 + 3s^2 + s^3 + 2s + 2$

$G'(s) = 4s^3 + 6s + 3s^2 + 2$

7. $y = \frac{x^2+4x+3}{\sqrt{x}}$

$x^{3/2} + 4x^{\frac{1}{2}} + 3x^{-1/2}$

$\frac{3\sqrt{x}}{2} + \frac{2}{\sqrt{x}} - \frac{3}{2x\sqrt{x}}$

8. $y = \sqrt{5x}$

$\frac{\sqrt{5}}{2\sqrt{x}}$ or $\frac{1}{2}\sqrt{\frac{5}{x}}$

or $\frac{\sqrt{5}}{2}x^{-1/2}$

9. $y = \frac{3t-7}{t^2+5t-4}$

$$\frac{3t^2+15t-12-(2t+5)(3t-7)}{(t^2+5t-4)^2}$$

$$\frac{3t^2+15t-12-(6t^2+t-35)}{(t^2+5t-4)^2}$$

$$\frac{-3t^2+14t+23}{(t^2+5t-4)^2}$$

10. $v = x\sqrt{x} + \frac{1}{x^2\sqrt{x}}$

$x^{3/2} + x^{-5/2}$

$$\frac{3\sqrt{x}}{2} - \frac{5}{2x^3\sqrt{x}}$$

$$\frac{3}{2}x^{1/2} - \frac{5}{2}x^{-7/2}$$

11. At what point on the curve $y = x\sqrt{x}$ is the tangent line parallel to the line $3x - y + 6 = 0$?

$y_1 = 3x + 6$ so $m = 3$

$y_2 = x^{3/2}$ $\quad y_2' = \frac{3\sqrt{x}}{2}$

$3 = \frac{3\sqrt{x}}{2}$

$2 = \sqrt{x}$

$4 = x \Rightarrow y = 4\sqrt{4} = 8$ so at $(4, 8)$

12. For what values of x does the graph of $f(x) = 2x^3 - 3x^2 - 6x + 87$ have a horizontal tangent?

$f'(x) = 0$

$f'(x) = 6x^2 - 6x - 6$

$6(x^2 - x - 1) = 0$

$$\frac{1 \pm \sqrt{1-4(1)(-1)}}{2} = \frac{1 \pm \sqrt{5}}{2}$$

13. Find the points on the curve $y = x^3 - x^2 - x + 1$ where the tangent is horizontal.

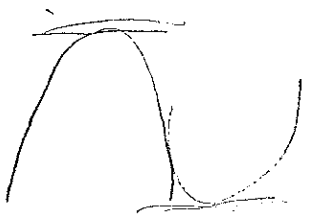
$y' = 0$

$y' = 3x^2 - 2x - 1$

$3x^2 - 2x - 1 = 0$

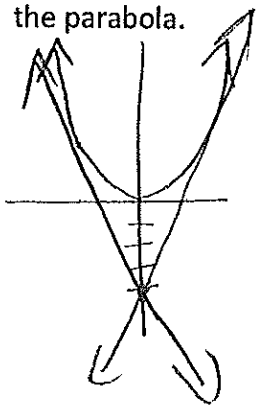
$(3x+1)(x-1) = 0$

$x = -\frac{1}{3}$ or 1



So $(-\frac{1}{3}, \frac{32}{27})$ & $(1, 0)$

14. Draw a diagram to show that there are two tangent lines to the parabola $y = x^2$ that pass through the point (0, -4). Find the coordinates of the points where these tangent lines intersect the parabola.



$y' = 2x$ or $2a$

(a, a^2)

$2a = \frac{-4 - a^2}{0 - a}$

$-2a^2 = -4 - a^2$

$-1a^2 = 4$

$a = \pm 2$

So at $(2, 4)$ & $(-2, 4)$

15. Show that the curve $y = 6x^3 + 5x - 3$ has no tangent line with a slope of 4.

$y' = 18x^2 + 5$

$18x^2 + 5 = 4$

$18x^2 + 1 = 0$

cannot happen b/c $18x^2$ is + & 1 is + so never will equal 0

or $\sqrt{x^2} = \sqrt{-\frac{1}{18}}$ ∈ imaginary