Chapter 2 Practice set #2 Answer Key

1. $\frac{d}{dx}x^n =$ $n x^{n-1}$

2. $\frac{d}{dx}\sin(x) =$ $\cos(x)$

3. $\frac{d}{dx}\cos(x) =$ $-\sin(x)$

4. $\frac{d}{dx}\tan(x) =$ $\sec^2(x)$

5. $\frac{d}{dx}\sec(x) =$ $\sec(x)\tan(x)$

6. $\frac{d}{dx}(x^3+3x^2-2x+4) =$ $3x^2+6x-2$

7. $\frac{d}{dx}(x\sin(x)) =$ $\sin(x) + x\cos(x)$

8. $\frac{d}{dx}(\sin(x)\cos(x)) =$ $\cos^2(x) - \sin^2(x) = \cos(2x)$

9. $\frac{d}{dx}((x-1)\tan(x)) =$ $\tan(x) + (x-1)\sec^2(x)$

10. $\frac{d}{dx}((2x+1)\sec(x)) =$ $2\sec(x) + (2x+1)\sec(x)\tan(x)$

11. $\frac{d}{dx}\left(\frac{x^3+3x^2-2x+4}{x^2+3}\right) =$ $\frac{(3x^2+6x-2)(x^2+3) - 2x(x^3+3x^2-2x+4)}{(x^2+3)^2} = \frac{x^4+11x^2+10x-6}{(x^2+3)^2}$

12. $\frac{d}{dx}\left(\frac{\sin(x)}{x^2+1}\right) =$ $\frac{(x^2+1)\cos(x) - 2x\sin(x)}{(x^2+1)^2}$

13. $\frac{d}{dx}\left(\frac{\cos(x)}{x}\right) =$ $\frac{-x\sin(x) - \cos(x)}{x^2}$

14. $\frac{d}{dx}\left(\frac{(x-1)}{\tan(x)}\right) =$ $\frac{\tan(x) - (x-1)\sec^2(x)}{\tan^2 x} = \cot(x) + (1-x)\csc^2(x)$

15. $\frac{d}{dx}\left(\frac{(2x+1)}{\sec(x)}\right) =$ $\frac{2\sec(x) - (2x+1)\sec(x)\tan(x)}{\sec^2(x)} = 2\cos(x) - (2x+1)\sin(x)$

Answer key

16. Find dy/dx for

$x^2 + y^3 + y = 2$

at the point (2,-1).

$$2x + 3y^2y' + y' = 0$$

$$2 \cdot 2 + 3(-1)^2y' + y' = 0$$

$$4y' = -4$$

$$y' = -1$$

17. Find dy/dx for

$xy^2 + x + y = 3$

at the point (2,-1).

$$y^2 + x2yy' + 1 + y' = 0$$

$$(-1)^2 + (2)2(-1)y' + 1 + y' = 0$$

$$-3y' = -2$$

$$y' = \frac{2}{3}$$

18. A point travels the curve $x^2 + y^3 + y = 2$ in such a way that dx/dt is 2 units per second. What is dy/dt at the point (2,-1)?

$$2x\frac{dx}{dt} + 3y^2\frac{dy}{dt} + \frac{dy}{dt} = 0$$

$$2(2)(2) + 3(-1)^2\frac{dy}{dt} + \frac{dy}{dt} = 0$$

$$4\frac{dy}{dt} = -8$$

$$\frac{dy}{dt} = -2$$