Ex 2.5

FIND THE DERIVATIVE OF EACH POLYNOMIAL FUNCTION

1. $y = 32$

$\frac{dy}{dx} = 0$

3. $y = x^5$

$\frac{dy}{dx} = 5(x^4)$

5. $y = 4x + 1$

$\frac{dy}{dx} = 4$

7. $y = 1 - 3x$

$\frac{dy}{dx} = -3$

9. $y = 5x^2$

$\frac{dy}{dx} = 10x$

11. $y = x^2 - 3x$

$\frac{dy}{dx} = 2x - 3$

13. $y = 4x^2 - 3x - 2$

$\frac{dy}{dx} = 8x - 3$

Ex 2.5

15. $y = 1 - 8x^2$

$\frac{dy}{dx} = -16x$

17. $y = 3x^3 + 2x^2 - 6x$

$\frac{dy}{dx} = 9x^2 + 4x - 6$.

19. $y = 4x^5 - 2x^3 + x + 3$

$\frac{dy}{dx} = 20x^4 - 6x^2 + 1$

21. $y = \frac{5}{2}x^8 - \frac{6}{5}x^5 + \frac{15}{2}x^4 - x^3 + \sqrt{2}$

$\frac{dy}{dx} = 20x^7 - 6x^4 + 30x^3 - 3x^2$

23. $y = \sqrt{7}x^4 - \sqrt{5}x^3 - \sqrt{3}x + \sqrt{7}$

$y = (7)^{\frac{1}{2}}x^4 - (5)^{\frac{1}{2}}x^3 - (3)^{\frac{1}{2}}x^1 + (7)^{\frac{1}{2}}$

$\frac{dy}{dx} = 4(7^{\frac{1}{2}})(x^3) - 3(5^{\frac{1}{2}})(x^2) - (3^{\frac{1}{2}})$

$\frac{dy}{dx} = 4\sqrt{7}x^3 - 3\sqrt{5}x^2 - \sqrt{3}$.

Ex 2.5

Find $f'(a)$ for each function.

#25 $y = 3x^2 + 2x - 1$; $a = -1$

$\frac{dy}{dx} = 6x + 2$

$\frac{dy}{dx} = (6)(-1) + 2$

$f' = -6 + 2$

$f' = -4$

#27. $y = 2x^3 - 6x^2 + 2x + 9$; $a = -3$

$\frac{dy}{dx} = 6x^2 - 12x + 2$

$f' = 6(-3)^2 - 12(-3) + 2$

$f' = 54 + 36 + 2$

$f' = 92$

#29. $y = 4x^5 + 3x^2 - 2$; $a = 1$

$\frac{dy}{dx} = 20x^4 + 6x$

$f' = 20 + 6$

$f' = 26$

#31. $y = 5x^4 + 8x^3 + 2x - 1$; $a = 0$

$\frac{dy}{dx} = 20x^3 + 24x^2 + 2$

$f' = 2$

Ex 2.5

#35 Find the Equation of the Tangent Line to the Curve

$y = x^3 + 4x^2 - x + 2$ @ Points $(\overset{x}{-2}, \overset{y}{12})$

$\frac{dy}{dx} = 3x^2 + 8x - 1$

$f'_{(x=-2)} = 3(-2)^2 + 8(-2) - 1$

$f' = 12 - 16 - 1$

$f' = -5$

now f' is the instantaneous Slope of the Line tangent to points $(-2, 12)$

SO,

$m_{tan} = -5$

the Equation for a Line is $y = mx + B$ (m: slope, B: y-Intercept)

Plug in Points $(-2, 12)$ and solve for the y-Intercept

$y = mx + B$

$12 = (-5)(-2) + B$

$12 = 10 + B$

$-10 \quad -10$

$B = 2$

THEREFORE

$\boxed{y = -5x + 2}$

Ex 2.5

#33. $y = 1 - 8x^2 - 5x^3 + 5x^6$; $a = 3$

$\frac{dy}{dx} = -16x - 15x^2 + 30x^5$

$f' = -16(3) - 15(3)^2 + 30(3)^5$

$f' = -48 - 135 + 7,29K$

$f' = 7107$

#35. Find Equation of the Tangent Line to the Curve

$y = x^3 + 4x^2 - x + 2$ at $(\underset{x}{-2}, \underset{y}{12})$

$\frac{dy}{dx} = 3x^2 + 8x - 1$

$= 3(-2)^2 + 8(-2) - 1$

$= 12 + -16 - 1$

$m_{TAN} = -5$

$y - y_1 = m(x - x_1)$

$y - 12 = -5(x - -2)$

$y - 12 = -5x - 10$
$+12 \quad +12$

$y = -5x + 2$

#37. $p = Ri^2$ Find rate of Change dp/di $R = 30\Omega$ $i = 2a$

$\frac{dp}{di} = 2Ri$

$\frac{dp}{di} = 2(30)(2)$

$\frac{dp}{di} = 120 W/A$

Ex 2.5

#39. $V = iR$; Find $\frac{dV}{dR}$ for $0.4A$ $R = 4\Omega$

$$\frac{dv}{dR} = i(1)$$

$$\frac{dv}{dR} = .4\,A/\Omega$$

#41 $y = x^{3/2}$

$$\frac{dy}{dx} = \frac{3}{2}x^{\frac{3}{2}-1}$$

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

$$\frac{dy}{dx} = \frac{3(x)^{1/2}}{2}$$

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

#43. $y = \frac{1}{x^4}$

$$y = x^{-4}$$

$$\frac{dy}{dx} = -4x^{-5}$$

$$\frac{dy}{dx} = \frac{-4}{x^5}$$

#45 $y = 6x^{20}$

$$\frac{dy}{dx} = 120x^{19}$$

EX 2.5

#47 $y = \frac{14}{x^9}$

$y = 14x^{-8}$

$\frac{dy}{dx} = -112x^{-9}$

$\frac{dy}{dx} = \frac{-112}{x^9}$

#49. $y = \frac{5}{\sqrt[3]{x}}$

$y = 5(x^{-\frac{1}{3}})$

$\frac{dy}{dx} = -\frac{5}{3}x^{-\frac{1}{3}-\frac{3}{3}}$

$\frac{dy}{dx} = \frac{-5x^{-\frac{4}{3}}}{3}$

$\frac{dy}{dx} = \frac{-5}{3x^{4/3}}$

#51 $V = ir'$ dv/dr $i = .5A$

$\frac{dv}{dr} = i$

$\frac{dv}{dr} = .5A/\Omega$