U2H5 ANSWERS

Find the derivative.

1. $y = 6x$

$y' = 6$

2. $f(x) = 5x^{\frac{1}{2}}$

$f'(x) = \frac{5}{2}x^{-1/2}$

$= \frac{5}{2\sqrt{x}}$

3. $g(x) = \sqrt[6]{x^5} = x^{5/6}$

$g'(x) = \frac{5}{6}x^{-1/6}$

$= \frac{5}{6x^{1/6}} = \frac{5}{6\sqrt[6]{x}}$

4. $f(x) = x^{\frac{-1}{3}}$

$f'(x) = -\frac{1}{3}x^{-4/3}$

$= \frac{-1}{3x^{4/3}} = \frac{-1}{3\sqrt[3]{x^4}}$

5. $y = e^2$

$y' = 0$

(e is a constant!)

6. $y = \frac{1}{x^{\frac{2}{3}}} = x^{-2/3}$

$y' = -\frac{2}{3}x^{-5/3}$

$= \frac{-2}{3x^{5/3}} = \frac{-2}{3x\sqrt[3]{x^5}}$

7. $\frac{d}{dx}(8x^{-3}) = -24x^{-4}$

$= \frac{-24}{x^4}$

8. $f(x) = (\sqrt[5]{x})^2 = x^{2/5}$

$f' = \frac{2}{5}x^{-3/5}$

$= \frac{2}{5x^{3/5}}$

$= \frac{2}{5\sqrt[5]{x^3}}$

9. $h(x) = (3x+4)^2 = 9x^2 + 24x + 16$

$h'(x) = 18x + 24$

10. $g(x) = \sqrt{x}(x^2 + 2x + 3) =$

$= x^{1/2}(x^2 + 2x + 3)$

$= x^{5/2} + 2x^{3/2} + 3x^{1/2}$

$g'(x) = \frac{5}{2}x^{3/2} + 2\cdot\frac{3}{2}x^{1/2} + 3\cdot\frac{1}{2}x^{-1/2}$

$= \frac{5}{2}\sqrt{x^3} + 3\sqrt{x} + \frac{3}{2\sqrt{x}}$

11. $\frac{d}{dx}(x^{0.35}) = .35x^{-.65}$

$= \frac{.35}{x^{.65}}$

12. $y = 5x^3 - 4x^2 + 8x + 5 + x^{-3} + x^{-5}$

$y' = 15x^2 - 8x + 8 - 3x^{-4} - 5x^{-6}$

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

13. If $f(x) = 3x^2 + 5$, find $f'(2)$

$f'(x) = 6x$

$f'(2) = 6(2) = 12$

14. Find the tangent line at x = 1 of $f(x) = x^5$

need pt: $(1, 1)$ + m: ?

$m = f'(x) = 5x^4$

$f'(1) = 5(1)^4 = 5$

so $m = 5$

$\boxed{y - 1 = 5(x - 1)}$

15. Find the tangent line at the point (8, 64) of $f(x) = 24\sqrt[3]{x} + 2x$

need: pt (8, 64) + m: ?

$m = f'(x) = 24\cdot\frac{1}{3}x^{-2/3} + 2$

$= \frac{8}{\sqrt[3]{x^2}} + 2$

$m = f'(8) = \frac{8}{\sqrt[3]{8^2}} + 2 = \frac{8}{2} + 2 = 4$

$\boxed{y - 64 = 4(x - 8)}$