

Name Answer Key

Date _____

Calc I H - 2.4 day 6 - Review

Period _____

Find the derivative of each function.

<p>1. $f(t) = (7+5t^5)^3$ $f'(t) = 3(7+5t^5)^2(25t^4)$ $f'(t) = 75t^4(7+5t^5)^2$</p>	<p>2. $f(t) = (5+4t)^{\frac{5}{3}}$ $f'(t) = \frac{5}{3}(5+4t)^{\frac{2}{3}}(4)$ $f'(t) = \frac{20}{3}(5+4t)^{\frac{2}{3}}$</p>
<p>3. $f(x) = x^7(4+5x)^5$ $f'(x) = 7x^6(4+5x)^5 + 5(4+5x)^4(5)(x^7)$ GCF $x^6(4+5x)^4$ $f'(x) = x^6(4+5x)^4(7(4+5x) + 25x)$ $f'(x) = x^6(4+5x)^4(28+35x+25x)$ $f'(x) = x^6(4+5x)^4(60x+28)$</p>	<p>4. $f(x) = x^3\sqrt{8-9x} = x^3(8-9x)^{\frac{1}{2}}$ GCF $x^2(8-9x)^{-\frac{1}{2}}$ $f'(x) = 3x^2(8-9x)^{\frac{1}{2}} + \frac{1}{2}(8-9x)^{-\frac{1}{2}}(-9)(x^3)$ $f'(x) = 3x^2(8-9x)^{-\frac{1}{2}}(\frac{3}{2}8 - 9x \cdot \frac{3}{2} - \frac{3}{2}x)$ $f'(x) = 3x^2(8-9x)^{-\frac{1}{2}}(\frac{16-21x}{2})$ $f'(x) = \frac{3x^2(16-21x)}{2\sqrt{8-9x}}$</p>
<p>5. $g(x) = \left(\frac{x+2}{x^2+8}\right)^7$ $g'(x) = 7\left(\frac{x+2}{x^2+8}\right)^6 \frac{(1(x^2+8) - 2x(x+2))}{(x^2+8)^2}$ $g'(x) = \frac{7(x+2)^6}{(x^2+8)^6} \cdot \frac{(x^2+8 - 2x^2 - 4x)}{(x^2+8)^2}$ $g'(x) = \frac{7(x+2)^6(-x^2-4x+8)}{(x^2+8)^8}$</p>	<p>6. $y = 4\cos 4x$ $y' = -4\sin(4x)(4)$ $y' = -16\sin(4x)$</p>
<p>7. $y = \cos(6x^3 - 6)$ $y' = -\sin(6x^3 - 6)(18x^2)$ $y' = -18x^2 \sin(6x^3 - 6)$</p>	<p>8. $y = -7\sin 2x$ $y' = -7\cos(2x)(2)$ $y' = -14\cos(2x)$</p>
<p>9. $f(\theta) = \frac{8}{9}\sin^2 2\theta = \frac{8}{9}(\sin(2\theta))^2$ $f'(\theta) = \frac{16}{9}\sin(2\theta)\cos(2\theta)(2)$ $f'(\theta) = \frac{32}{9}\sin(2\theta)\cos(2\theta)$</p>	<p>10. $y = \frac{4}{5}\sec^2 x = \frac{4}{5}(\sec x)^2$ $y' = \frac{8}{5}\sec x(\sec x \tan x)$ $y' = \frac{8}{5}\sec^2 x \tan x$</p>
<p>11. $f(t) = 4\sec^2(5\pi t - 2) = 4(\sec(5\pi t - 2))^2$ $f'(t) = 8\sec(5\pi t - 2)(\sec(5\pi t - 2)\tan(5\pi t - 2))(5\pi)$ $f'(t) = 40\pi \sec^2(5\pi t - 2)\tan(5\pi t - 2)$</p>	

Evaluate the derivative of the function at the given point.

12. $y = \sqrt[4]{6x^3 + 5x}, x = 1$ $y = (6x^3 + 5x)^{1/4}$

$$y' = \frac{1}{4} (6x^3 + 5x)^{-3/4} (18x^2 + 5)$$

$$y' = \frac{18x^2 + 5}{4(6x^3 + 5x)^{3/4}} = \frac{18x^2 + 5}{4 \sqrt[4]{(6x^3 + 5x)^3}}$$

$$y'(1) = \frac{18(1)^2 + 5}{4 \sqrt[4]{(6+5)^3}} = \boxed{\frac{23}{4 \sqrt[4]{1331}}}$$

13. $f(t) = \frac{9t+5}{3t-1}, \left(4, \frac{41}{11}\right)$

$$f'(t) = \frac{9(3t-1) - 3(9t+5)}{(3t-1)^2}$$

$$f'(t) = \frac{27t - 9 - 27t - 15}{(3t-1)^2} = \frac{-24}{(3t-1)^2}$$

$$f'(4) = \frac{-24}{(3(4)-1)^2} = \boxed{\frac{-24}{121}}$$

14. $f(t) = \frac{5t^2+3}{2t-1}, \left(4, \frac{83}{7}\right)$

$$f'(t) = \frac{10t(2t-1) - 2(5t^2+3)}{(2t-1)^2}$$

$$f'(t) = \frac{20t^2 - 10t - 10t^2 - 6}{(2t-1)^2} = \frac{10t^2 - 10t - 6}{(2t-1)^2}$$

$$f'(4) = \frac{10(4)^2 - 10(4) - 6}{(2(4)-1)^2} = \boxed{\frac{354}{49}}$$

15. $f(t) = \frac{4}{t-1}, \left(4, \frac{4}{3}\right)$ $f(t) = 4(t-1)^{-1}$

$$f'(t) = -4(t-1)^{-2} (1)$$

$$f'(t) = \frac{-4}{(t-1)^2}$$

$$f'(4) = \boxed{\frac{-4}{9}}$$

Find an equation to the tangent line for the graph of f at the given point.

16. $f(x) = (2x^3 + 4)^2, (-1, 4)$

$$f'(x) = 2(2x^3 + 4)(6x^2)$$

$$f'(x) = 12x^2(2x^3 + 4)$$

$$f'(-1) = 12(-1)^2(2(-1)^3 + 4) = 24$$

$$(-1, 4) \quad m = 24$$

$$\boxed{y - 4 = 24(x + 1)}$$

Find the 2nd derivative of the function.

17. $f(x) = (5x^5 + 8)^3$

$$f'(x) = 3(5x^5 + 8)^2 (25x^4)$$

$$f'(x) = 75x^4 (5x^5 + 8)^2$$

$$f'(x) = 300x^3 (5x^5 + 8)^2 + 2(5x^5 + 8)(25x^4)(75x^4)$$

$$f'(x) = 50x^3 (5x^5 + 8) (6(5x^5 + 8) + 75x^5)$$

$$\boxed{f'(x) = 50x^3 (5x^5 + 8) (105x^5 + 48)}$$

18. $f(x) = \sin 5x^3$

$$f'(x) = \cos(5x^3) \cdot (15x^2)$$

$$f''(x) = -\sin(5x^3) (15x^2) (15x^2) + 30x \cos(5x^3)$$

$$\boxed{f''(x) = -225x^4 \sin(5x^3) + 30x \cos(5x^3)}$$