

Homework #7 Answer Key

$$1. f'(x) = \frac{\sec(4x) \cdot 9 \left(\cos x - \frac{1}{\sqrt{x}}\right)^8 \cdot \left(-\sin x + \frac{1}{2} x^{-3/2}\right) - \left(\cos x - \frac{1}{\sqrt{x}}\right)^9 \cdot \sec(4x) \tan(4x) \cdot 4}{(\sec(4x))^2}$$

$$2. y' = 3(\sin(x^3))^2 \cdot \cos(x^3) \cdot 3x^2$$

$$3. y' = 3(\tan \sqrt{x^9 - \cos x})^2 \cdot \sec^2 \sqrt{x^9 - \cos x} \cdot \frac{1}{2\sqrt{x^9 - \cos x}} \cdot (9x^8 + \sin x)$$

$$4. f'(t) = t^2 \cdot 5(\sin(2t))^4 \cdot \cos(2t) \cdot 2 + \sin^5(2t) \cdot (2t)$$

$$5. g'(x) = \frac{\sin(4x) \cdot (-\sin(3x)) \cdot 3 - \cos(3x) \cos(4x) \cdot 4}{\sin^2(4x)}$$

$$6. g'(t) = -\sin\left(\sin^3\left(\frac{t}{\sqrt{t+1}}\right)\right) \cdot 3\left(\sin\left(\frac{t}{\sqrt{t+1}}\right)\right)^2 \cdot \cos\left(\frac{t}{\sqrt{t+1}}\right) \cdot \left(\frac{\sqrt{t+1}(1) - t \cdot \frac{1}{2\sqrt{t+1}} \cdot (1)}{(\sqrt{t+1})^2}\right)$$

t+1

$$7. g'(x) = \frac{1}{2} \left(\cos(x^2 - \sin x)\right)^{-1/2} \cdot (-\sin(x^2 - \sin x)) \cdot (2x - \cos x)$$

$$8. g'(x) = \cos \sqrt{x^2 + \sec x} \cdot \frac{1}{2} (x^2 + \sec x)^{-1/2} \cdot (2x + \sec x \cdot \tan x)$$

$$9. f'(x) = -\left(\tan(\sqrt{x} + \cos x)\right)^{-2} \cdot \sec^2(\sqrt{x} + \cos x) \cdot \left(\frac{1}{2\sqrt{x}} - \sin x\right)$$

$$10. g'(0) = 4$$

$$11. H'\left(\frac{\pi}{3}\right) = 2\sqrt{3} \quad \text{and} \quad H'\left(\frac{\pi}{8}\right) = -4$$

$$12. f'\left(\frac{\pi}{12}\right) = -5\sqrt{3}$$

$$13. \frac{dy}{dx} = \frac{\sec x \tan x - y \cos(xy)}{x \cos(xy) + 1}$$

14. Answer The runners are moving $\frac{507}{25}$ yards per second at that moment.

$$15. s(t) = \frac{t^3}{6} - \cos t + 3t - 1 \quad \text{feet}$$

$$16. f(x) = \tan x - \sqrt{3} \cos x + \frac{9\sqrt{3}}{2}$$

$$17. \frac{2}{3} x^{3/2} + \sqrt{x} + C$$

$$18. \frac{7}{18} x^{18/7} + \frac{14}{15} x^{15/14} + C$$

$$19. \frac{2}{7} x^{7/2} + \frac{2}{5} x^{5/2} - 2x^{-1/2} - \frac{2}{3} x^{-3/2} + C$$

$$20. \frac{8}{14} x^2 + \frac{7}{8} x - 8x^{1/8} + \frac{7}{15} x^{15/7} - 49x^{-1/7} - \frac{64}{15} x^{15/8} + C$$