

Answers to WIR 4 Review Problems

1. a.) $\frac{7}{2}$
 b.) $\frac{25}{3}$
 c.) 0
2. $f'(x) = \sec x \tan^2 x + \sec^3 x$
3. $h'(x) = \frac{-\csc^2 x \sin x - \cot x \cos x}{\sin^2 x}$
4. $y - 2 = 4(x - \frac{\pi}{4})$
5. 20
6. $f'(x) = 5x^4 \sec^2(x^5)$
7. $f'(x) = 12 \sin^2(4x) \cos(4x)$
8. $y = -\frac{3}{2}x + 4$
9. $f'(x) = (x^2 + 1)^3(2 - 3x)^2(-33x^2 + 16x - 9)$
10. $G'(x) = -\sin(f(x))f'(x) - \sin x f'(\cos x)$
11. $f'(x) = \frac{1}{8\sqrt{1 + \sqrt{1 + \sqrt{x}}}\sqrt{1 + \sqrt{x}}\sqrt{x}}$
12. $y' = \sec(\sec(\sec(x))) \tan(\sec(\sec(x))) \sec(\sec(x)) \tan(\sec(x)) \sec(x) \tan(x)$
13. $\frac{dy}{dx} = \frac{12x - 4xy^3}{5y^4 + 6x^2y^2 + 2y}$
14. $\frac{dy}{dx} = \frac{3x^2y^3 + \sin(x - 2y)}{2 \sin(x - 2y) - 3x^3y^2}$
15. $y = x$.
16. First note the curves intersect at the point $(3, 2)$. Furthermore, the slope of the tangent line to the curve $x^2 - y^2 = 5$ at the point $(3, 2)$ is $\frac{3}{2}$ and the slope of the tangent line to the curve $4x^2 + 9y^2 = 72$ at the point $(3, 2)$ is $\frac{-2}{3}$ and these are negative reciprocals.
17. $\langle 2, 9 \rangle$
18. a.) Velocity: $\langle 5, 20 \rangle$; speed: $\sqrt{425}$ units of distance/units of time
 b.) The ball hits the ground with a speed of $\sqrt{1321}$ units of distance/units of time
 c.) The ball travels a (horizontal) distance of 90 units.
19. a.) The graph is the ellipse $x^2/4 + y^2/9 = 1$.
 b.) Position vector: $\langle 1, 1.5\sqrt{3} \rangle$; Tangent vector: $\langle -\sqrt{3}, 1.5 \rangle$
 c.) $x = 1 - \sqrt{3}t$, $y = 1.5\sqrt{3} + 1.5t$
20. $y'' = \frac{1}{\sqrt{x^2 + 1}} - \frac{x^2}{(x^2 + 1)\sqrt{x^2 + 1}}$
21. $\theta \approx 15^\circ$
22. $y - \frac{\pi^2}{16} = -\frac{\pi}{\sqrt{2}}(x - \frac{\sqrt{2}}{2})$
23. a.) $y - 9 = \frac{3}{4}(x - 5)$
 b.) Vertical: $(0, 0)$ and $(-27, 9)$. Horizontal: $(-3, -3)$