

Sample problems for Test 2. Answers

3. (a) $f'(x) = (5x^4 + 9x^2 - 1)(x^4 - 2x^2 + 4) + (x^5 + 3x^3 - x + 10)(4x^2 - 8x)$
 (b) $f'(x) = \frac{2(2x+3)(\sqrt{x}+2) - x^{-1/2}(x^2+3x+3)}{2(\sqrt{x}+2)^2}$
 (c) $f'(x) = 1 + \frac{5}{3}x^{2/3} + \frac{3}{2}x^{1/2} - \frac{3}{2}x^{-5/2} + \frac{2}{3}x^{-1/3}$
 (d) $f'(x) = (\csc 2x)^{-1/2}(-\csc 2x \cot 2x) + 4x \tan(x^2 + 1) \sec^2(x^2 + 1)$
 (e) $f'(x) = \frac{1}{2}(x \cos x + x)^{-1/2}(\cos x - x \sin x + 1)$
4. $y = \frac{7}{4}(x - 1) + 2$
5. (a) $v(t) = 3t^2 - 12$, $a(t) = 6t$
 (b) $t > 2$
 (c) 23
6. $\frac{5}{2}$
7. $y' = \frac{y^2 \sec^2 x - \cos(x+y)}{\cos(x+y) - 2y \tan x}$
8. Vector equation: $\langle x, y \rangle = \langle 3, 0 \rangle + t \langle 4, 2 \rangle$. Parametric equations: $x = 3 + 4t$,
 $y = 2t$
9. $\vec{v}(1) = \langle 1, 15 \rangle$, $s(1) = \sqrt{226}$, $\vec{a}(1) = \langle 0, -10 \rangle$
10. $y'' = 2 \cos(3x) - 12x \sin(3x) + 9x^2 \cos(3x)$
11. $f^{(54)}(x) = -54 \sin x - x \cos x$
12. Slope of the tangent line equals $-\frac{12}{7}$ when $t = -1$ and $t = -\frac{4}{3}$. Point on the curve corresponding to $t = -1$ is $(-5, 6)$. Point on the curve corresponding to $t = -\frac{4}{3}$ is $(-\frac{208}{27}, \frac{32}{3})$.
13. -0.15 rad/s
14. $\frac{1}{80}$ m/min
15. ≈ 58.24
16. $\frac{1}{1+x^2} \approx \frac{1}{2} - \frac{1}{2}(x-1)$