

ANSWERS

1. (a) $f'(x) = 0$
(b) $p'(s) = 5s^4 - 8s^3 + 9s^2 - 8s + 5$
(c) $f'(t) = \frac{9\sqrt{t}}{2} - \frac{5}{2\sqrt{t}} - \frac{1}{2t\sqrt{t}}$
(d) $g'(x) = 2xe^x + x^2e^x - \frac{11}{4}x^{7/4} - \frac{3}{x^2}$
(e) $q'(y) = \frac{y^2 + 2y}{(y + 1)^2}$
(f) $f'(x) = \cos(4)(3x^2 - 3)$
(g) $g'(x) = \frac{3x^2 \cos x + (x^3 - 5) \sin x}{\cos^2 x}$
(h) $h'(x) = e^x \left(\frac{1}{x^{3/4}} + \frac{2}{x} - \frac{3}{4x^{7/4}} - \frac{2}{x^2} \right)$
(i) $f'(x) = \frac{1}{x\sqrt{1 - (\ln x)^2}}$
(j) $g'(x) = 6e^{\sec 2x} \sec 2x \tan 2x$
(k) $h'(x) = 2x \arctan x + 1$
(l) $k'(x) = \frac{1}{(\ln 2)x}$
2. (a) $f'(x) = 2e^{2x} + 3x^2$
 $f''(x) = 4e^{2x} + 6x$
 $f'''(x) = 8e^{2x} + 6$
 $f^{(4)}(x) = 16e^{2x}$
 $f^{(5)}(x) = 32e^{2x}$
(b) $g'(x) = 36x^{1/3}$
 $g''(x) = 12x^{-2/3}$
 $g'''(x) = -8x^{-5/3}$

$$g^{(4)}(x) = \frac{40}{3}x^{-8/3}$$

$$g^{(5)}(x) = -\frac{320}{9}x^{-11/3}$$

3. $(2, -128)$ and $(-2, 128)$.

4. $y = \frac{1}{3}x + 2$.

5. (a) $y' = \frac{3y^3 - 3x^2y^3}{3x^3y^2 - 9xy^2 + 4}$

(b) $2^3 \cdot 1^3 - 3 \cdot 2 \cdot 1^3 + 4 \cdot 1 = 6$.

(c) -0.9 .

6. (a) $f'(x) = \frac{7(x+1)(x^2+2)^2}{(x^3+3)^3} \left(\frac{1}{x+1} + \frac{4x}{x^2+2} - \frac{9x^2}{x^3+3} \right)$

(b) $g'(x) = 10(\sin x)^{\cos x} (x^2-2)^3 \left(-\sin x \ln(\sin x) + \frac{(\cos x)^2}{\sin x} + \frac{6x}{x^2-2} \right)$

7. $L(x) = x - 1$. $\ln(1.13) \approx 0.13$.

8. (a) $-\frac{18}{13}$, decreasing.

(b) $\frac{80}{17}$, increasing.

9. $36\pi \text{ cm}^3/\text{min}$.