

MA 223 Even Answers

Section 3.1

- 2) $f'(x) = 0$
- 10) $f'(r) = 4\pi r^2$
- 14) $f'(u) = -\frac{1}{u^{3/2}}$
- 20) $f'(x) = 4x^3 - 4x$
- 26) $f'(x) = \frac{20}{3}x^{1/3} - x^{1/2} + 2x - 3$
- 30) $f'(x) = -\frac{15}{x^4} + \frac{4}{x^3} + \frac{1}{x^2}$
- 34) $f'(x) = -\frac{9}{x^4} - \frac{2}{x^{3/2}}$
- 36) a) 1 b) 23
- 42) $m = \frac{16}{3}; y = \frac{16}{3}x + \frac{11}{3}$
- 44) $m = \frac{3}{16}; y = \frac{3}{16}x + \frac{7}{4}$
- 46) $(0, 0), (\frac{8}{3}, -\frac{256}{27})$
- 54) a) $N'(t) = -3t^2 + 12t + 15$
b) 27 talkies/hr. ; 24 talkies/hr.
c) 26 talkies
- 56) a) $S'(x) = -0.006x^2 + 1.2x + 1$
b) \$61,000/thousand dollars; \$46,000/thousand dollars
increasing at a faster rate when amount spent is
\$100,000 on advertising

Section 3.2

- 6) $f'(x) = 2(3x^2 - x - 1)$
- 8) $f'(x) = 15x^4 + 8x^3 - 108x^2 - 48x$
- 10) $f'(x) = x^4 + 4x^3 - 3x^2 - 1$
- 16) $g'(x) = -\frac{3}{2(x+2)^2}$
- 20) $f'(u) = \frac{1-u^2}{(u^2+1)^2}$
- 26) $f'(x) = -\frac{2x^2+4x-1}{(2x^2+2x+3)^2}$
- 32) $h'(1) = 2$
- 40) $m = \frac{8}{9}; y = \frac{8}{9}x - \frac{4}{9}$
- 44) $y = -\frac{9}{2}x + 12$
- 46) $(-1, -\frac{1}{2})$ and $(1, \frac{1}{2})$
- 50) a) $C'(t) = \frac{0.2(1-t^2)}{(t^2+1)^2}$
b) 0.096%/hr; 0%/hr; -0.024%/hr
- 56) \$38.4 million/yr; \$17.04 million/yr; \$5.71 million/yr

Section 3.3

- 2) $f'(x) = -3(1-x)^2$
- 16) $f'(x) = -\frac{16x}{(x^2-1)^5}$
- 18) $f'(x) = -\frac{2x}{\sqrt{(2x^2-1)^3}}$
- 32) $g'(u) = -2u(26u^2+11)(1+u^2)^4(1-2u^2)^7$
- 34) $f'(x) = -\frac{10(x+1)^4}{(x-1)^6}$
- 42) $g'(t) = \frac{4(2t-1)(5-3t)}{(3t+2)^5}$
- 52) $\frac{dy}{dx} = 8x(x^2+1)$
- 56) $h'(0) = -6$

Section 3.4

- 4) a) \$114, \$120.16, \$138.12
b) \$114, \$120, \$138
- 6) a) $\bar{C}(x) = \frac{5000}{x} + 2$
b) $\bar{C}'(x) = -\frac{5000}{x^2}$
- 10) a) $R(x) = -0.04x^2 + 800x$
b) $R'(x) = -0.08x + 800$
c) $R'(5000) = \$400$
- 12) a) \$750 b) \$760
- 16) a) $\bar{C}'(x) = 0.000004x - 0.02 - \frac{60,000}{x^2}$
b) -0.0024, average cost decreasing when 5000 produced
0.0194, average cost increasing when 10,000 produced

Section 3.5

- 10) $h'(x) = (x^2+1)(5x^2-4x+1); h''(x) = 4(5x^3-3x^2+3x-1)$
- 14) $g'(u) = (8u-1)(2u-1)^2; g''(u) = 12(2u-1)(4u-1)$
- 18) $f'(u) = -\frac{u^2-1}{(u^2+1)^2}; f''(u) = \frac{2u(u^2-3)}{(u^2+1)^3}$
- 34) a) $h'(t) = \frac{1}{4}t^3 - 3t^2 + 8t$
b) $h'(0) = 0, h'(4) = 0, h'(8) = 0$ ft/sec
c) $h''(t) = \frac{3}{4}t^2 - 6t + 8$
d) $h''(0) = 8, h''(4) = -4, h''(8) = 8$ ft/sec²
e) $h(0) = 0, h(4) = 16, h(8) = 0$ feet

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Section 3.6

2) a) $y' = -\frac{3}{4}$ b) $y' = -\frac{3}{4}$

4) a) $y' = -\frac{1}{(x-1)^2}$ b) $y' = -\frac{1}{(x-1)^2}$

12) $y' = -\frac{3x^2}{3y^2 + 1}$

14) $y' = -\frac{2x+5y}{5x+2y}$

16) $y' = \frac{2y(1-xy)}{x(3xy-4)}$

18) $y' = -\left(\frac{y}{x}\right)^{2/3}$

20) $y' = 2x(2x+3y)^{2/3} - \frac{2}{3}$

22) $y' = -\frac{y^4}{x^4}$

34) $y = \frac{2}{3}x - \frac{5}{3}$

36) $y'' = -\frac{2x(x^3 + y^3)}{y^5}$

40) 14.18 ft/sec

42) -500 tires/week

48) 7.5 cu in/sec

50) 19.21 ft/sec

52) 40.6 ft/sec

54) 3.04 ft/sec

56) a) 0.0064 cm/sec; 1.6 cm³/sec

60) -3.75 ft/sec

Section 3.7

16) a) $dy = (6x - 2)dx$

b) $dy \approx -0.3$

c) $\Delta y = -0.2973$

18) a) $dy = \frac{dx}{\sqrt{2x+1}}$

b) $dy \approx 0.03333$

c) $\Delta y = 0.03315$

20) $dy = \frac{dx}{2\sqrt{x}}; \sqrt{17} \approx 4.125$

24) $dy = \frac{1}{4x^{3/4}} dx; \sqrt[4]{81.6} \approx 3.0056$

30) 270 cm³

32) $\pm 0.076 \text{ cm}^3$

36) \$2,000

38) \$0.75

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