MA 223 Even Answers

Section 3.1

2) $f'(x) = 0$

10) $f'(r) = 4\pi r^2$

14) $f'(u) = -\dfrac{1}{u^{3/2}}$

20) $f'(x) = 4x^3 - 4x$

26) $f'(x) = \dfrac{20}{3}x^{1/3} - x^{1/2} + 2x - 3$

30) $f'(x) = -\dfrac{15}{x^4} + \dfrac{4}{x^3} + \dfrac{1}{x^2}$

34) $f'(x) = -\dfrac{9}{x^4} - \dfrac{2}{x^{3/2}}$

36) a) 1   b) 23

42) $m = \dfrac{16}{3}$; $y = \dfrac{16}{3}x + \dfrac{11}{3}$

44) $m = \dfrac{3}{16}$; $y = \dfrac{3}{16}x + \dfrac{7}{4}$

46) $(0,0), (\dfrac{8}{3}, -\dfrac{256}{27})$

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) $g'(x) = -\dfrac{3}{2(x+2)^2}$

20) $f'(u) = \dfrac{1 - u^2}{(u^2 + 1)^2}$

26) $f'(x) = -\dfrac{2x^2 + 4x - 1}{(2x^2 + 2x + 3)^2}$

32) $h'(1) = 2$

40) $m = \dfrac{8}{9}$; $y = \dfrac{8}{9}x - \dfrac{4}{9}$

44) $y = -\dfrac{9}{2}x + 12$

46) $(-1, -\dfrac{1}{2})$ and $(1, \dfrac{1}{2})$

50) a) $C'(t) = \dfrac{0.2(1 - t^2)}{(t^2 + 1)^2}$

   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) $f'(x) = -\dfrac{16x}{(x^2 - 1)^5}$

18) $f'(x) = -\dfrac{2x}{\sqrt{(2x^2 - 1)^3}}$

32) $g'(u) = -2u(26u^2 + 11)(1 + u^2)^4(1 - 2u^2)^7$

34) $f'(x) = -\dfrac{10(x+1)^4}{(x-1)^6}$

42) $g'(t) = \dfrac{4(2t-1)(5-3t)}{(3t+2)^5}$

52) $\dfrac{dy}{dx} = 8x(x^2 + 1)$

56) $h'(0) = -6$

Section 3.4

4) a) $114, $120.16, $138.12

   b) $114, $120, $138

6) a) $\overline{C}(x) = \dfrac{5000}{x} + 2$

   b) $\overline{C}'(x) = -\dfrac{5000}{x^2}$

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) $\overline{C}'(x) = 0.000004x - 0.02 - \dfrac{60,000}{x^2}$

   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) $f'(u) = -\dfrac{u^2 - 1}{(u^2 + 1)^2}$; $f''(u) = \dfrac{2u(u^2 - 3)}{(u^2 + 1)^3}$

34) a) $h'(t) = \dfrac{1}{4}t^3 - 3t^2 + 8t$

   b) $h'(0) = 0, h'(4) = 0, h'(8) = 0$ ft/sec

   c) $h''(t) = \dfrac{3}{4}t^2 - 6t + 8$

   d) $h''(0) = 8, h''(4) = -4, h''(8) = 8$ ft/sec^2

   e) $h(0) = 0, h(4) = 16, h(8) = 0$ feet

Section 3.6

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

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

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

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

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

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

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

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

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

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

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 $\text{cm}^3/\sec$

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) $dy = \dfrac{dx}{\sqrt{2x+1}}$

b) $dy \approx 0.03333$

c) $\Delta y = 0.03315$

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

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

30)   270 cm^3

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

36) $2,000

38) $0.75