

Math 1550 Answers to Homework—Even numbered problems

Chapter 10

§10.5 2. $(-\infty, 3), (5, \infty)$; 4. $(-\infty, -7], [2, \infty)$; 10. $[-3, -2], [5, \infty)$; 18. $(-\infty, -1), (0, 1)$

Chapter 11

§11.1 20. -6 ; 22. $\frac{1}{2}$; 24. $y + 1 = 6(x - 1)$; 28. $y + 1 = \frac{3}{5}(x - 2)$

§11.2 20. $f'(t) = -26t + 14$; 36. $y' = 15x^2 + \frac{2}{5}x^{-7/5}$; 44. $f'(x) = -300x^{-4} + fx^{-1/2}$;
54. $\phi'(x) = x^2 + 9x^{-4}$; 60. $y' = -\frac{1}{4}x^{-1/3}$; 64. $f'(x) = 27x^8 - 25x^4 + 12x^2$; 68. $f'(x) =$
 $\frac{13}{5}x^{8/5} + \frac{56}{5}x^{3/5} + \frac{33}{5}x^{-2/5}$; 72. $f'(x) = 4x^3 + 6x^2 - 16x$; 74. $f'(x) = \frac{35}{24}x^{5/2} + \frac{1}{8}x^{1/2}$;
84. $y + 7 = -\frac{25}{8}(x - 4)$; 86. $x = \pm 1$; 88. $x = \pm 2$

§11.3 16. $c' = 0.2q + 3, 3.6$; 18. $c' = 0.12q^2 - q + 4.4, 2.4, 54.4, 119004.4$; 20. $c' = 2, 2, 2$; 22.
 $c' = 0.003q^2 - 0.6q + 40, 36.3, 29.2$; 24. $r' = 15 - \frac{1}{15}q, 44/3, 43/3, 40/3$; 26. $r' = 60 - 0.4q, 56, 52$

§11.5 12. $f'(x) = 4x^3 - 6x^2 - 12x + 9$; 14. $h'(x) = 20x^4 + 144x^2 + 96x - 30$; 22.
 $H'(x) = -25(5 - x)^{-2}$; 28. $z' = \frac{7x^2 + 28x - 7}{(x^2 + 2x + 5)^2}$; 40. $q'(x) = 6x + \frac{8}{(x+2)^2} + \frac{8}{x^3}$; 70. $1 - \frac{1}{2\sqrt{150}}, \frac{1}{2\sqrt{150}}$

§11.6 2. $(6(7x - x^3)^2 - 8)(7x - x^3)$; 4. $\frac{1}{4}(x^4 - x^4 + 3)^{-3/4}(5x^4 - 4x^3)$; 6. -10 ; 8. 410 ; 16.
 $-12(2x^3 - 8x)^{-13}(6x^2 - 8)$; 22. $\frac{16}{3}x(8x^2 - 1)^{-2/3}$; 40. $(3x + 2)^4(4x - 5)(84x - 59)$; 42. $\frac{128x^3}{(x+2)^5}$;
44. $\frac{38x}{3(8x^2 - 3)^{2/3}(x^2 + 2)^{4/3}}$

Chapter 12:

§12.1 6. $\frac{6x+2}{3x^2+2x+1}$; 8. $\frac{2x-6}{x^2-6x}$; 12. $2x \ln x + x$; 18. $2x \log_2 x + \frac{x}{\ln 2}$; 20. $\frac{2x \ln x - x}{(\ln x)^2}$; 26. $\frac{4}{t} - \frac{1+2t}{1+t+t^2}$;
34. $\frac{6}{x} - \frac{6}{2x+1}$; 38. $(\ln 2)x^{\ln 2 - 1} + (\ln 2)^x \ln \ln 2$; 42. $\frac{3}{x} + \frac{1}{4x+2}$; 48. $\frac{25}{\ln(q+2)} - \frac{25q}{(q+2)(\ln(q+2))^2}$

§12.2 8. $(2x + 18x^2)e^{x^2+6x^3+1}$; 12. $(1 + 3x)e^{3x}$; 16. $(x \ln 2 + 2)x2^x$; 18. $(1 - \frac{1}{2\sqrt{x}})e^{x-\sqrt{x}}$; 20.
 $6e^{2x}(e^{2x} + 1)^2$

§12.3 4. $-1/2$; 6. $-49/48$; 8. -1 ; 10. -1 ; 12. $-4/21$; 14. $-4/5$

§12.4 4. $\frac{2x}{3y}$; 6. $-(\frac{y}{x})^{4/5}$; 12. 1 ; 24. $\frac{1}{2xy+2y^2-1}$; 28. 0

§12.5 6. $y(\frac{1}{x+2} + \frac{x}{x^2+9} + \frac{2}{6x+1})$; 8. $y(\frac{x}{x^2+5} - \frac{1}{2(x+9)})$; 10. $y(\frac{1}{x} + \frac{4x}{1+x^2} - \frac{x}{2+x^2})$; 12. $y(\frac{2x^2}{x^3+1} + \frac{2}{x} - \frac{4}{3})$;
14. $y(\frac{\ln 2x}{2\sqrt{x}} + \frac{1}{\sqrt{x}})$; 22. $1/e$; 24. $y = x$

§12.7 2. $48x$; 4. -2 ; 6. $\frac{2}{(q+1)^3}$; 8. $-\frac{6}{x^4}$; 30. 0

Chapter 13.

§13.1 2. increasing on $(-1, 0), (1, \infty)$, decreasing on $(-\infty, -1), (0, 1)$; 12. increasing on
 $(-\infty, 2)$, decreasing on $(2, \infty)$, relative maximum at $x = 2$; 14. increasing on $(-3, \infty)$, de-
creasing on $(-\infty, -3)$, relative minimum at $x = -3$; 16. increasing on $(-2, 2)$, decreasing on

$(-\infty, -2), (2, \infty)$, relative minimum at $x = -2$, relative maximum at $x = 2$; 36. increasing on $(-\infty, -2), (2, \infty)$, decreasing on $(-2, 0), (0, 2)$, relative maximum at $x = -2$, relative minimum at $x = 2$; 56. increasing on $(0, \infty)$, decreasing on $(-\infty, 0)$, relative minimum at $x = 0$, symmetry about the y-axis, $(0, -16), (2, 0), (-2, 0)$; 58. increasing on $(-\infty, -\frac{2}{3}), (1, \infty)$, decreasing on $(-\frac{2}{3}, 1)$, relative maximum at $x = -\frac{2}{3}$, relative minimum at $x = 1$, $(0, 4)$; 60. increasing on $(-\infty, 0), (1, \infty)$, decreasing on $(0, 1)$, relative maximum at $x = 0$, relative minimum at $x = 1$, $(0, 0), (\frac{5}{4}, 0)$; 62. increasing on $(1, \infty)$, decreasing on $(0, 1)$, relative minimum at $x = 1$, $(0, 0), (2, 0)$; 64. increasing on $(-\infty, -2), (0, \infty)$, decreasing on $(-2, 0)$, relative maximum at $x = -2$, relative minimum at $x = 0$, $(0, 0), (-5, 0)$; 68. always increasing; 70. $\bar{c}'(q) = -\frac{1}{2}q^{-3/2} < 0$ for $q > 0$.

§13.2 8. maximum 73 at $x = 3$, minimum $13/49$ at $x = 3/7$; 10. maximum 18.75 at $x = 3$, minimum 2.75 at $x = \pm 1$; 12. maximum 0.5 at $x = 1$, minimum 0 at $x = 0$

§13.3 10. concave down on $(-\infty, 2)$, concave up on $(2, \infty)$, inflection point at $x = 2$; 12. concave up on $(-\infty, -\frac{2}{\sqrt{3}}), (\frac{2}{\sqrt{3}}, \infty)$, concave down on $(-\frac{2}{\sqrt{3}}, \frac{2}{\sqrt{3}})$, inflection points at $x = \pm \frac{2}{\sqrt{3}}$; 26. concave up on $(-3, \infty)$, concave down on $(-\infty, -3)$, no inflection point; 32. concave up on $(2, \infty)$, concave down on $(-\infty, 2)$, inflection point at $x = 2$; 42. intercepts: $(0, 0), (3, 0)$, increasing on $(-\infty, 1), (3, \infty)$, decreasing on $(1, 3)$, relative maximum at $x = 1$, relative minimum at $x = 3$, concave up on $(2, \infty)$, concave down on $(-\infty, 2)$, inflection point at $x = 2$; 52. intercepts: $(0, 0), (1, 0)$, increasing on $(0, \frac{1}{2}), (1, \infty)$, decreasing on $(-\infty, 0), (\frac{1}{2}, 1)$, relative maximum at $x = \frac{1}{2}$, relative minimums at $x = 0, 1$, concave up on $(-\infty, \frac{1}{2} - \frac{1}{2\sqrt{3}}), (\frac{1}{2} + \frac{1}{2\sqrt{3}}, \infty)$, concave down on $(\frac{1}{2} - \frac{1}{2\sqrt{3}}, \frac{1}{2} + \frac{1}{2\sqrt{3}})$, inflection points at $x = \frac{1}{2} \pm \frac{1}{2\sqrt{3}}$; 60. intercepts: $(0, 2), (-4, 0), (-1, 0)$, increasing on $(-3, -\infty)$, decreasing on $(-4, -3)$, relative minimum at $x = -3$, concave up on $(-4, \infty)$, no inflection point

§13.4 4. relative and absolute minimum at $x = 5/6$; 6. relative minimum at $x = 4$, relative maximum at $x = -4$; 8. relative and absolute minimum at $x = \pm 1$, relative maximum at $x = 0$

13.5 4. vertical asymptote: no, horizontal asymptote: $y = 1$; 6. vertical asymptote: $x = 0$, horizontal asymptote: $y = 1$; 8. vertical asymptote: $x = \pm 2$, horizontal asymptote: $y = 0$; 10. vertical asymptote: $x = \pm 3$, horizontal asymptote: no; 16. vertical asymptote: $x = \frac{1}{2}, x = 4$, horizontal asymptote: $y = 1$; 26. increasing on $(-\infty, \frac{3}{2}), (\frac{3}{2}, \infty)$, concave up on $(\frac{3}{2}, \infty)$, concave down on $(-\infty, \frac{3}{2})$, no relative extrema, no inflection point, vertical asymptote: $x = \frac{3}{2}$, horizontal asymptote: $y = 0$; 28. decreasing on $(0, \infty)$, concave up on $(0, \infty)$; 30. intercept: $(0, \frac{1}{2})$, increasing on $(-\infty, 2 - \frac{1}{\sqrt{3}}), (2 + \frac{1}{\sqrt{3}}, \infty)$, decreasing on $(2 - \frac{1}{\sqrt{3}}, 2), (2, 2 + \frac{1}{\sqrt{3}})$, relative minimum at $x = 2 + \frac{1}{\sqrt{3}}$, relative maximum at $x = 2 - \frac{1}{\sqrt{3}}$, concave up on $(2, \infty)$, concave down on $(-\infty, 2)$, no inflection point, vertical asymptote: $x = 2$, horizontal asymptote: no; 42. intercept: $(0, 0)$, increasing on $(-2, 2)$, decreasing on $(-\infty, -2), (2, \infty)$, relative minimum at $x = -2$, concave up on $(-4, 2), (2, \infty)$, concave down on $(-\infty, -4)$, inflection point at $x = -4$, vertical asymptote: $x = 2$, horizontal asymptote: $y = 0$.