Corrections for Advanced Functions

Chapter 1		
Location	**Question**	**Correct Answer**
Getting Started	4d	D = $\{x \in \mathbf{R}\}$, R = $\{y \in \mathbf{R} \mid -3 \le y \le 3\}$ (Correct in solutions manual)
1.2	4d	Entire number line should be shaded on graph.
Mid-Chapter Review	2b	D = [0, 10]
Mid-Chapter Review	2c	R = [10, 50]
1.4	3	(–4, –10)
1.4	7c	$g(x) = -2(2^{3(x-1)}) + 4$
1.4	9c	(–1, –23)
1.4	12	Graph of $h(x)$ (green) should be reflection of graph of $f(x)$ over x-axis.
1.5	6b	Labels should be in degrees, not radians. Curves should not have arrowheads at ends.
1.6	6	$\begin{cases} 15, \mathit{if}\ 0 \le x \le 500 \\ 15 + 0.02(x - 500), \mathit{if}\ x \ge 500 \end{cases}$
1.6	12	discontinuous at $p = 15$; continuous at $0 < p < 15$
Chapter Review	3	R = $\{f(x) \in \mathbf{R} \mid f(x) \ge -1\}$
Chapter Review	17a	$\begin{cases} 30, \mathit{if}\ x \le 200 \\ 24 + 0.03x, \mathit{if}\ x > 200 \end{cases}$ (Correct in solutions manual)
Chapter Self-Test	7a	(–2, 17)
Chapter Self-Test	9a	\$11 500
Chapter Self-Test	9b	$\begin{cases} 0.05, \mathit{if}\ x \le 50\,000 \\ 0.12x - 5500, \mathit{if}\ x > 50\,000 \end{cases}$
Chapter 2		
Location	**Question**	**Correct Answer**
Mid-Chapter Review	1b	750; 0; 250; 1100; 400 m^3/month
Mid-Chapter Review	3b	$t \approx 2$; Answers may vary. For example: The graph has a vertex at (2, 21). It appears that a tangent line at this point would be horizontal. $\frac{(f(2.01) - f(1.99))}{0.02}$
2.5	2	0 mm Hg/s
Chapter Review	4a	Answers may vary. For example, because the unit of the equation is years, you would not choose $3 \le t \le 4$ and $4 \le t \le 5$. A better choice would be $3.75 \le t \le 4.0$ and $4 \le t \le 4.25$.
Chapter Review	8	Graph should start at (0, 0) and connect to the rest of the curve.

Chapter 3		
Location	**Question**	**Correct Answer**
Getting Started	8	The values of x that make $f(x) = 0 = n$ (Located on arrow above box with "The zeros are –2 and –6.")
3.4	2e	$y = x^2$; reflection in the x-axis, vertical stretch by a factor of 4.8, and horizontal translation 3 units right (Correct in solutions manual)
3.4	6f	(–11, –3), (–4, –2), (10, 6)
3.5	3c	$x - 6$
3.5	6d	$x^2 + 2x - 8$ remainder –4
3.6	8a	Graph is incorrect; should be graph of $y = (x + 6)(x + 5)(x - 2)$
Chapter Review	2	As $x \to -\infty$, $y \to +\infty$, and as $x \to \infty$, $y \to -\infty$.
Chapter 4		
Location	**Question**	**Correct Answer**
4.1	2d	$0, \frac{2}{5}, -3$ (Correct in solutions manual)
4.1	14c	0.45 s, 3.33 s (Correct in solutions manual)
4.1	16	$x = -3$, $x = -2$, $x = 5$ (Correct in solutions manual)
4.2	17b	Move the terms with variables to one side and constants to the other. Graph $y = 2^x - x$ and $y = 4$ on a graphing calculator and determine where $y = 2^x - x$ is below $y = 4$. $-3.93 < x < 2.76$
4.2	11a	Answers may vary. For example, $\frac{1}{2}x + 1 < 3$
4.2	19b	$\{x \in \mathbf{R} \mid -3 \geq y \geq 3\}$
4.2	19d	$\{x \in \mathbf{R} \mid x \leq -3\}$; $(-\infty, -3)$ graph should be shaded from –3 to left
Mid-Chapter Review	6a	Answers may vary. For example, $3x + 1 > x + 15$
Mid-Chapter Review	6b	Answers may vary. For example, $5x - 1 < x - 33$
Mid-Chapter Review	6c	Answers may vary. For example, $x - 3 \leq 3x - 1 \leq x - 13$
4.3	6e	$-\frac{3}{2} \leq x$ or $x \geq 3$ (Correct in solutions manual)
4.3	18	$x - 1 \leq$ or $x \geq 2$ (Correct in solutions manual)
4.4	2e	$0 \leq x \leq 2$
4.4	4a	7 (Correct in solutions manual)
4.4	4b	Answers may vary. For example, (4.5, 3). (Correct in solutions manual)
4.4	11a	Remove graph.
4.4	11b, 11c	Answers should be combined. (Correct in solutions manual)
Chapter Review	3b	–3.10 (Correct in solutions manual)
Chapter Review	6a	Answers may vary. For example, $3x + 1 > x + 17$

Chapter Review	6b	Answers may vary. For example, $4x - 4 \geq x - 16$
Chapter Review	6c	Answers may vary. For example, $3x + 3 \leq x - 21$
Chapter Review	6d	Answers may vary. For example, $x - 19 < 3x - 1 < x - 3$
Chapter Review	7b	$x \in (-\infty, -\frac{23}{8}]$
Chapter Self-Test	8a	$\{x \in \mathbf{R} \mid -2 < x < 7\}$
Chapter 5		
Location	**Question**	**Correct Answer**
Getting Started	2f	$\frac{a-b}{2a-3b}$, $a \neq -3, 3$
Getting Started	3c	$-4x + 8$, $x \neq -2, 3$
Getting Started	4d	$\frac{3x+6}{x^2-3x}$, $x \neq 0, 3$
Getting Started	4f	$\frac{-2a+50}{(a+3)(a-5)(a-4)}$, $x \neq -3, 4, 5$
Getting Started	5d	$x = 11$
5.1	9a	$D = \{x \in \mathbf{R}\}$ $R = \{y \in \mathbf{R}\}$ y-intercept = 8 x-intercept = –4 negative on $(-\infty, -4)$ positive on $(-4, -\infty)$ increasing on $(-\infty,\infty)$ equation of reciprocal: $y = \frac{1}{2x+8}$
5.1	9b	$D = \{x \in \mathbf{R}\}$ $R = \{y \in \mathbf{R}\}$ y-intercept = –3 x-intercept = $-\frac{3}{4}$ positive on $(-\infty, -\frac{3}{4})$ negative on $(-\frac{3}{4}, \infty)$ decreasing on $(-\infty, \infty)$ equation of reciprocal: $y = \frac{1}{-4x-3}$
5.1	9c	$D = \{x \in \mathbf{R}\}$ $R = \{y \in \mathbf{R} \mid y \leq -12.25\}$ y-intercept = 12 x-intercepts = , –3 decreasing on $(-\infty, 0.5)$

		increasing on (0.5, ∞) positive on (–∞,–3) negative on (–3, 4) equation of reciprocal: $y = \dfrac{1}{x^2 - x - 12}$
5.1	9d	D = $\{x \in \mathbf{R}\}$ R = $\{y \in \mathbf{R} \mid y \le 0.5\}$ y-intercept = –12 x-intercepts = 3, 2 increasing on (–∞, 2.5) decreasing on (2.5, ∞) negative on (–∞, 2) and (3, ∞) positive on (2, 3) equation of reciprocal: $y = \dfrac{1}{-2x^2 + 10x - 12}$
5.1	12e	D = $\{x \in \mathbf{R} \mid 1 \le x \le 10\,000\}$, R = $\{y \in \mathbf{R} \mid 1 \le y \le 10\,000\}$
5.2	1d	D; The function in the denominator has zeros at $x = 1$ and $x = –3$. the rational function has vertical asymptotes as $x = 1$ and $x = –3$.
5.2	2i	vertical asymptote at $x = -\frac{1}{4}$; horizontal asymptote at $y = 2$
5.2	3c	$y = \dfrac{x + 2}{x^2 + x - 2}$
5.3	2e	D = $\{x \in \mathbf{R} \mid x \ne 2\}$ R = $\{y \in \mathbf{R} \mid y \ne 0\}$
5.3	3f	positive: (–∞, –1) and $(\frac{3}{4}, \infty)$ negative: $(-1, \frac{3}{4})$
5.3	4a	$x = –3$; As $x \to –3$ from the left, $y \to –\infty$. As $x \to –3$ from the right, $y \to \infty$.
5.3	4b	$x = 5$; As $x \to 5$ from the left, $y \to –\infty$. As $x \to 5$ from the right, $y \to \infty$.
5.3	4c	$x = \frac{1}{2}$; As $x \to \frac{1}{2}$ from the left, $y \to –\infty$. As $x \to \frac{1}{2}$ from the right, $y \to$.
5.3	4d	$x = -\frac{1}{4}$; As $x \to -\frac{1}{4}$ from the left, $y \to –\infty$. As $x \to -\frac{1}{4}$ from the right, $y \to \infty$.
5.3	5c	vertical asymptote at $x = \frac{1}{4}$ horizontal asymptote at $y = \frac{1}{4}$ D = $\{x \in \mathbf{R} \mid x \ne \frac{1}{4}\}$ R = $\{y \in \mathbf{R} \mid y \ne \frac{1}{4}\}$

		x-intercept = –5 y-intercept = –5 $f(x)$ is positive on $(-\infty, -5)$ and $(\frac{1}{4}, \infty)$ and negative on $(-5, \frac{1}{4})$. The function is decreasing on $(-\infty, \frac{1}{4})$ and on $(\frac{1}{4}, \infty)$. The function is never increasing.
5.3	7a	The equation has a general vertical asymptote at $x = -\frac{1}{n}$. The function has a general horizontal asymptote at $y = \frac{8}{n}$. The vertical asymptotes are $-\frac{1}{8}, -\frac{1}{4}, -\frac{1}{2}$, and –1. The horizontal asymptotes are 8, 4, 2, and 1. The function contracts as n increases. The function is positive on $(-\infty, -\frac{1}{n})$ and $(0, \infty)$. The function is negative on $(-\frac{1}{n}, 0)$.
5.3	7c	The horizontal asymptote is $y = \frac{8}{n}$, but because n is negative, the value of y is negative. The vertical asymptote is $x = -\frac{1}{n}$, but because n is negative, the value of x is positive. The function is negative on $(-\infty, 0)$ and $(-\frac{1}{n}, \infty)$. The function is positive on $(0, -\frac{1}{n})$.
5.3	8	$f(x)$ will have a vertical asymptote at $x = 1$; $g(x)$ will have a horizontal asymptote at $x = \frac{1}{2}$. $f(x)$ will have a horizontal asymptote at $x = 3$; $g(x)$ will have a vertical asymptote at $x = \frac{1}{2}$.
5.3	10	The concentration increases over the 24 h period and approaches approximately 1.85 mg/L.
5.3	14a	$f(x)$ and $m(x)$
5.3	14b	$g(x)$
Mid-Chapter Review	2a	$D = \{x \in \mathbf{R}\}$; $R = \{y \in \mathbf{R}\}$; y-intercept = 6; x-intercept = $-\frac{3}{2}$; negative on $(-\infty, -\frac{3}{2})$; positive on $(-\frac{3}{2}, \infty)$; increasing on $(-\infty, \infty)$
Mid-Chapter Review	2b	$D = \{x \in \mathbf{R}\}$; $R = \{y \in \mathbf{R} \mid y \geq -4\}$; y-intercept = –4; x-intercepts are 2 and –2; decreasing on $(-\infty, 0)$; increasing on $(0, \infty)$; positive on $(-\infty, -2)$; increasing on $(2, \infty)$;negative on $(-2, 2)$
Mid-Chapter Review	2c	$D = \{x \in \mathbf{R}\}$; $R = \{y \in \mathbf{R} \mid y \geq 6\}$; y-intercept = 6; no x-intercepts; function will never be negative; decreasing on $(-\infty, 0)$; increasing on $(0, \infty)$
Mid-Chapter	2d	$D = \{x \in \mathbf{R}\}$; $R = \{y \in \mathbf{R}\}$; y-intercept = –4;

Review		x-intercept = –2; function is always decreasing; positive on $(-\infty, -2)$; negative on $(-2, \infty)$
Mid-Chapter Review	4a	$x = 2$; horizontal asymptote
Mid-Chapter Review	4e	$x = -5$ and $x = 3$ (delete "vertical asymptotes")
Mid-Chapter Review	5	$y = \frac{x}{x-2}, y = 1; y = -\frac{7}{4}; y = \frac{1}{x^2+2x-15}, y = 0$
Mid-Chapter Review	6a	$D = \{x \in \mathbf{R} \mid x \neq 6\}$; vertical asymptote: $x = 6$; horizontal asymptote: $y = 0$; no x-intercept; y-intercept: $-\frac{5}{6}$; negative when the denominator is negative; positive when the numerator is positive; $x - 6$ is negative on $x < 6$; $f(x)$ is negative on $(-\infty, 6)$ and positive on $(6, \infty)$; function is decreasing on $(-\infty, 6)$ and $(6, \infty)$
Mid-Chapter Review	6b	$D = \{x \in \mathbf{R} \mid x \neq -4\}$; vertical asymptote: $x = -4$; horizontal asymptote: $y = 3$; x-intercept: $x = 0$; y-intercept: $f(0) = 0$; function is increasing on $(-\infty, -4)$ and $(-4, \infty)$; positive on $(-\infty, -4)$ and $(0, \infty)$; negative on $(-4, 0)$
Mid-Chapter Review	6c	$D = \{x \in \mathbf{R} \mid x \neq 2\}$; straight, horizontal line with a hole at $x = -2$; always positive and never increases or decreases
Mid-Chapter Review	6d	$D = \{x \in \mathbf{R} \mid x \neq \frac{1}{2}\}$; vertical asymptote: $x = \frac{1}{2}$; horizontal asymptote: $y = \frac{1}{2}$; x-intercept: $x = 2$; y-intercept: $f(0) = 5$; function is increasing on $(-\infty, \frac{1}{2})$ and $(\frac{1}{2}, \infty)$
5.4	1	Yes; answers may vary. For example, substituting each value for x in the equation produces the same value on each side of the equation, so both are solutions.
5.4	6d	$x = 0$ and $x = 1$
5.4	6e	$x = -1$ and $x = -\frac{27}{13}$
5.4	7e	$x = -1.72, 2.72$
5.4	8a	$\frac{x+1}{x-2} = \frac{x+3}{x-4}$ Multiply both sides by the LCD, $(x-2)(x-4)$. $(x-2)(x-4)\left(\frac{x+1}{x-2}\right)$ $= (x-2)(x-4)\left(\frac{x+3}{x-4}\right)$ $(x-4)(x+1) = (x-2)(x+3)$ Simplify. $x^2 - 3x - 4 = x^2 + x - 6$ Simplify the equation so that 0 is on one side of the equation. $x^2 - x^2 - 3x - x - 4 + 6$ $= x^2 - x^2 + x - x - 6 + 6$

		$-4x + 2 = 0$ $-4x = -2$ $x = \frac{1}{2}$
5.4	12a	After 6666.67 min
5.4	13b	1.05 min
5.5	1a	$(-\infty, 1)$ and $(3, \infty)$
5.5	4a	$-5 < x < -4.5$
5.5	4f	$-1 < x < \frac{7}{8}$ and $x > 4$
5.5	5d	$t < -5$ and $0 < t < 3$
5.5	6a	$x \in (-6, -1]$ or $x \in (4, \infty)$
5.5	6b	$x \in (-\infty, -3)$
5.5	6c	$x \in (-4, -2]$ or $x \in (-1, 2]$
5.5	7a	$x < -6, -1 < x < \frac{1}{2}, x > 2$
5.5	8c	It would be difficult to find a situation that could be represented by these rational expressions because very few positive values of t yield a positive value of y.
5.5	9	Yes, as $f(t) - g(t) > 0$ on the interval (0, 0.31). For instance, the bacteria in the tap water will outnumber the bacteria in the pond water after $t = 0.2$ days.
5.5	10a	$\frac{(x-5)(x+1)}{2x} < 0$
5.5	11	when $1 < x < 5$
5.5	14	$14.48° < x < 165.52°$ and $180° < x < 360°$
5.5	15	$0° < x < 2°$
5.6	5d	11.72
5.6	6a	slope = 286.1; vertical asymptote: $x = -0.3$
5.6	6b	slope = 2.74; vertical asymptote: $x = -5$
5.6	6c	slope = –44.64; vertical asymptote: $x = -\frac{5}{3}$
5.6	7b	0
5.6	9b	–$1.22 per T-shirt
5.6	10a	–11 houses per month
5.6	10b	–1 house per month
5.6	12d	The instantaneous speed for a specific time, t, is the acceleration of the object at this time.
Chapter Review	1b	$D = \{x \in \mathbf{R}\}$; $R = \{y \in \mathbf{R} \mid y \geq -10.125\}$; x-intercept = 0.5 and –4; positive on $(-\infty, -4)$ and $(0.5, \infty)$; negative on $(-4, 0.5)$; decreasing on $(-\infty, -1.75)$; increasing on $(-1.75, \infty)$
Chapter Review	1c	$D = \{x \in \mathbf{R}\}$; $R = \{y \in \mathbf{R} \mid y \geq 2\}$; no x-intercepts; y-intercept = 2; decreasing on $(-\infty, 0)$; increasing on $(0, \infty)$; always positive; never negative
Chapter Review	4	The locust population increased during the first 1.4 years, to reach a maximum of 1 287 000. The population

		gradually decreased until the end of the 50 years, when the population was 141 400.
Chapter Review	10d	$0 < x < 1.5$ or $x = 3$
Chapter Review	11	$t > 64.73$
Chapter Review	14	(6, 6)
Chapter Self-Test	6b	The graph will have a hole at $x = -\frac{b}{a}$ rather than a vertical asymptote at this point if it happens that $cx + d = k(ax + b)$ for some real number k.
Chapter 6		
Location	**Question**	**Correct Answer**
6.1	7c	$-\pi$ radians
6.1	7e	$-\frac{3\pi}{4}$
6.1	7h	$-\frac{2\pi}{3}$
6.1	9b	81.25 m
6.1	16	86.81 radians/s
6.2	2d iv	$\theta = \frac{\pi}{2}$
6.2	4c	$-\cot\left(\frac{\pi}{4}\right)$
6.2	4d	$-\sec\left(\frac{\pi}{6}\right)$
6.2	8a	$-\cos\left(\frac{\pi}{4}\right)$
6.2	8b	$-\tan\left(\frac{\pi}{6}\right)$
6.2	8c	$-\csc\left(\frac{\pi}{3}\right)$
6.2	8d	$-\cot\left(\frac{\pi}{3}\right)$
6.2	8e	$-\sin\left(\frac{\pi}{6}\right)$
6.4	5b	period = 6π, amplitude = 6, equation of the axis is $y = 6$; $y = -6\sin(0.5x) - 2$
6.4	9b	50
6.6	9	$0.98 \le t \le 1.52$ min, 3.48 min $\le t \le$ 4.02 min, 5.98 min $\le t \le$ 6.52 min
6.6	10a	$n(t) = 3.7 \cos\left(\frac{\pi}{183}(t - 172)\right) + 12$

6.6	10b	y = 9.2 hours
6.7	9b	fastest: t = 4 months, t = 16 months, t = 28 months, t = 40 months; slowest: t = 10 months, t = 22 months , t = 34 months, t = 46 months
6.7	9c	about 1.01 mice per owl/month
Chapter Review	6a	$\tan\theta = \frac{12}{-5}$
Chapter Review	6c	about 112.6° or 247.4°
Chapter Review	10	$y = 3\cos\left(x + \frac{3\pi}{4}\right) - 1$
Chapter Self-Test	3	$y \approx 94.9$
Chapter 7		
Location	**Question**	**Correct Answer**
7.4	4b	$\text{LS} = 1 - 2\sin^2 x$ $= \cos^2 x$ $= 2\cos^2 x - 1$ = RS
7.4	9a	$\text{LS} = \frac{\cos^2\theta - \sin^2\theta}{\cos^2\theta + \sin\theta\cos\theta}$ $= \frac{(\cos\theta - \sin\theta)(\cos\theta + \sin\theta)}{(\cos\theta)(\cos\theta + \sin\theta)}$ $= \frac{\cos\theta - \sin\theta}{\cos\theta}$ $= \frac{\cos\theta}{\cos\theta} - \frac{\sin\theta}{\cos\theta}$ $= 1 - \tan\theta$ = RS
7.4	9c	$\text{RS} = \frac{1}{\cos^2 x} - 1 - \cos^2 x$ $= \frac{1}{\cos^2 x} - \frac{\cos^2 x}{\cos^2 x} - \cos^2 x$ $= \frac{1 - \cos^2 x}{\cos^2 x} - \cos^2 x$ $= \frac{\sin^2 x}{\cos^2 x} - \cos^2 x$ $= \tan^2 x - \cos^2 x$ = LS
7.4	9d	$\text{LS} = \frac{1 - \cos\theta}{(1 + \cos\theta)(1 - \cos\theta)} + \frac{1 + \cos\theta}{(1 + \cos\theta)(1 - \cos\theta)}$ $= \frac{1 - \cos\theta + 1 + \cos\theta}{1 - \cos^2\theta}$

		$= \dfrac{2}{\sin^2\theta}$ $= \text{RS}$
7.4	10a	$\text{LS} = \cos x\tan^3 x$ $= \cos x\left(\dfrac{\sin^3 x}{\cos^3 x}\right)$ $= \dfrac{\sin^3 x}{\cos^2 x}$ $= \dfrac{\sin^3 x}{\cos^2 x}\sin x$ $= \tan^2 x\sin x$ $= \text{RS}$
7.4	10b	$\text{LS} = \sin^2\theta + \cos^4\theta$ $= \sin^2\theta + \cos^2\theta\cos^2\theta$ $= \sin^2\theta + (1-\sin^2\theta)(1-\sin^2\theta)$ $= \sin^2\theta + \left(1-2\sin^2\theta + \left(\sin^2\theta\sin^2\theta\right)\right)$ $= \sin^2\theta + 1 - 2\sin^2\theta + \left(\sin^2\theta\sin^2\theta\right)$ $= 1-\sin^2\theta + \sin^2\theta\sin^2\theta$ $= \cos^2\theta + \sin^2\theta\sin^2\theta$ $= \cos^2\theta + \sin^4\theta$ $= \text{RS}$
7.4	10c	$\text{LS} = (\sin x + \cos x)\left(\dfrac{\tan^2 x + 1}{\tan x}\right)$ $= (\sin x + \cos x)\left(\dfrac{\sec^2 x}{\tan x}\right)$ $= (\sin x + \cos x)\left(\dfrac{1}{\cos^2 x}\right)\left(\dfrac{1}{\tan x}\right)$ $= (\sin x + \cos x)\left(\dfrac{\cos x}{\sin x\cos^2 x}\right)$ $= (\sin x + \cos x)\left(\dfrac{1}{\cos^2 x}\right)\left(\dfrac{\cos x}{\sin x}\right)$ $= (\sin x + \cos x)\left(\dfrac{1}{\sin x\cos x}\right)$ $= \dfrac{\sin x}{\sin x\cos x} + \dfrac{\cos x}{\sin x\cos x}$ $= \dfrac{1}{\cos x} + \dfrac{1}{\sin x}$ $= \text{RS}$
7.4	10d	$\text{LS} = \tan^2\beta + \cos^2\beta + \sin^2\beta$ $= \tan^2\beta + 1$ $= \sec^2\beta$

		$= \dfrac{1}{\cos^2 \beta}$ $= \text{RS}$
7.4	10e	$\text{LS} = \sin\left(\dfrac{\pi}{4} + x\right) + \sin\left(\dfrac{\pi}{4} - x\right)$ $= \sin\dfrac{\pi}{4}\cos x + \cos\dfrac{\pi}{4}\sin x + \sin\dfrac{\pi}{4}\cos x - \cos\dfrac{\pi}{4}\sin x$ $= 2\sin\dfrac{\pi}{4}\cos x$ $= (2)\left(\dfrac{\sqrt{2}}{2}\right)(\cos x)$ $= \sqrt{2}\cos x$ $= \text{RS}$
7.4	10f	$\text{LS} = \sin\left(\dfrac{\pi}{2} - x\right)\cot\left(\dfrac{\pi}{2} + x\right)$ $= \sin\left(\dfrac{\pi}{2} - x\right)\left(\dfrac{\cos\left(\dfrac{\pi}{2} + x\right)}{\sin\left(\dfrac{\pi}{2} + x\right)}\right)$ $= \left(\sin\dfrac{\pi}{2}\cos x - \cos\dfrac{\pi}{2}\sin x\right) \times \left(\dfrac{\cos\dfrac{\pi}{2}\cos x - \sin\dfrac{\pi}{2}\sin x}{\sin\dfrac{\pi}{2}\cos x + \cos\dfrac{\pi}{2}\sin x}\right)$ $= ((1)(\cos x) - (0)(\sin x)) \times \left(\dfrac{(0)(\cos x) - (1)(\sin x)}{(1)(\cos x) + (0)(\sin x)}\right)$ $= (\cos x - 0)\left(\dfrac{0 - \sin x}{\cos x + 0}\right)$ $= (\cos x)\left(-\dfrac{\sin x}{\cos x}\right)$ $= -\sin x$ $= \text{RS}$
7.4	11a	$\text{LS} = \dfrac{\cos 2x + 1}{\sin 2x}$ $= \dfrac{2\cos^2 x - 1 + 1}{2\sin x\cos x}$ $= \dfrac{2\cos^2 x}{2\sin x\cos x}$ $= \dfrac{\cos x}{\sin x}$ $= \cot x$ $= \text{RS}$
7.4	11b	$\text{LS} = \dfrac{\sin 2x}{1 - \cos 2x}$

		$=\dfrac{2\sin x\cos x}{1-(1-2\sin^2 x)}$ $=\dfrac{2\sin x\cos x}{1-1+2\sin^2 x}$ $=\dfrac{2\sin x\cos x}{2\sin^2 x}$ $=\dfrac{\cos x}{\sin x}$ $=\cot x$ $=$ RS
7.4	11c	LS $=(\sin x+\cos x)^2$ $=\sin^2 x+2\sin x\cos x+\cos^2 x$ $=1+2\sin x\cos x$ $=1+\sin 2x$ $=$ RS
7.4	11d	LS $=\cos^4\theta-\sin^4\theta$ $=(\cos^2\theta-\sin^2\theta)(\cos^2\theta+\sin^2\theta)$ $=(\cos^2\theta-\sin^2\theta)(1)$ $=\cos 2\theta$ $=$ RS
7.4	11e	LS $=\cot\theta-\tan\theta$ $=\dfrac{\cos\theta}{\sin\theta}-\dfrac{\sin\theta}{\cos\theta}$ $=\dfrac{\cos^2\theta-\sin^2\theta}{\sin\theta\cos\theta}$ $=\dfrac{\cos 2\theta}{\sin\theta\cos\theta}$ $=\dfrac{\cos 2\theta}{\frac{1}{2}\sin 2\theta}$ $=2\dfrac{\cos 2\theta}{\sin 2\theta}$ $=2\cot 2\theta$ $=$ RS
7.4	11f	LS $=\dfrac{\cos\theta}{\sin\theta}+\dfrac{\sin\theta}{\cos\theta}$ $=\dfrac{\cos^2\theta+\sin^2\theta}{\sin\theta\cos\theta}$ $=\dfrac{1}{\sin\theta\cos\theta}$ $=\dfrac{1}{\frac{1}{2}\sin^2\theta}$ $=\dfrac{2}{\sin 2\theta}$

		$= 2\csc 2\theta$ $= \text{RS}$
7.4	11g	$\text{RS} = \tan\left(x + \frac{\pi}{4}\right)$ $= \dfrac{\tan x + \tan\frac{\pi}{4}}{1 - \tan x \tan\frac{\pi}{4}}$ $= \dfrac{\tan x + 1}{1 - (\tan x)(1)}$ $= \dfrac{1 + \tan x}{1 - \tan x}$ $= \text{LS}$
7.4	11h	$\text{LS} = \csc 2x + \cot 2x$ $= \dfrac{1}{\sin 2x} + \dfrac{1}{\tan 2x}$ $= \dfrac{1}{\sin 2x} + \dfrac{1}{\left(\frac{\sin 2x}{\cos 2x}\right)}$ $= \dfrac{1}{\sin 2x} + \dfrac{\cos 2x}{\sin 2x}$ $= \dfrac{1 + \cos 2x}{\sin 2x}$ $= \dfrac{1 + (1 - 2\sin^2 x)}{2\sin x \cos x}$ $= \dfrac{2 - 2\sin^2 x}{2\sin x \cos x}$ $= \dfrac{2(1 - \sin^2 x)}{2\sin x \cos x}$ $= \dfrac{1 - \sin^2 x}{\sin x \cos x}$ $= \dfrac{\cos^2 x}{\sin x \cos x}$ $= \dfrac{\cos x}{\sin x}$ $= \cot x$ $= \text{RS}$
7.4	11i	$\text{LS} = \dfrac{2\tan x}{1 + \tan^2 x}$ $= \dfrac{2\tan x}{\sec^2 x}$ $= \dfrac{2\tan x}{\left(\frac{1}{\cos^2 x}\right)}$

		$= (2\tan x)(\cos^2 x)$ $= \left(2\frac{\sin x}{\cos x}\right)(\cos^2 x)$ $= 2\sin x\cos x$ $= \sin 2x$ = RS
7.4	11j	RS $= \frac{\csc t}{\csc t - 2\sin t}$ $= \frac{\frac{1}{\sin t}}{\left(\frac{1}{\sin t} - 2\sin t\right)}$ $= \frac{\frac{1}{\sin t}}{\left(\frac{1}{\sin t} - \frac{2\sin^2 t}{\sin t}\right)}$ $= \frac{\frac{1}{\sin t}}{\left(\frac{1-2\sin^2 t}{\sin t}\right)}$ $= \frac{1}{1-2\sin^2 t}$ $= \frac{1}{\cos 2t}$ $= \sec 2t$ = LS
7.4	11k	RS $= \frac{1}{2}(\sec\theta)(\csc\theta)$ $= \frac{1}{2}\left(\frac{1}{\cos\theta}\right)\left(\frac{1}{\sin\theta}\right)$ $= \frac{1}{2\cos\theta\sin\theta}$ $= \frac{1}{\sin 2\theta}$ $= \csc 2\theta$ = LS
7.4	11l	RS $= \frac{2\sin t\cos t}{\sin t} - \frac{2\cos^2 t - 1}{\cos t}$ $= \frac{2\sin t\cos^2 t}{\sin t\cos t} - \frac{\sin t(2\cos^2 t - 1)}{\cos t\sin t}$ $= \frac{2\sin t\cos^2 t - 2\cos^2 t\sin t + \sin t}{\cos t\sin t}$

		$= \dfrac{\sin t}{\cos t \sin t}$ $= \dfrac{1}{\cos t}$ $= \sec t$ = LS
Chapter Review	8	$\text{LS} = \dfrac{\cos^2 x}{\cot^2 x}$ $= \dfrac{\cos^2 x}{\left(\dfrac{\cos^2 x}{\sin^2 x}\right)}$ $= \dfrac{(\cos^2 x)(\sin^2 x)}{\cos^2 x}$ $= \sin^2 x$ $= 1 - \cos^2 x$ = RS
Chapter Review	9	$\text{LS} = \dfrac{2(\sec^2 x - \tan^2 x)}{\csc x}$ $= \dfrac{2(1)}{\csc x}$ $= \dfrac{2}{\csc x}$ $= 2\sin x$ $= \dfrac{2\sin x \cos x}{\cos x}$ $= \dfrac{\sin 2x}{\cos x}$ $= \sin 2x \sec x$ = RS
Chapter Self-Test	1	$\text{RS} = \dfrac{1 - 2\sin^2 x}{\cos x + \sin x} + \sin x$ $= \dfrac{1 - 2\sin^2 x + \sin x(\cos x + \sin x)}{\cos x + \sin x}$ $= \dfrac{1 - 2\sin^2 x + \sin x \cos x + \sin^2 x}{\cos x + \sin x}$ $= \dfrac{1 - \sin^2 x + \sin x \cos x}{\cos x + \sin x}$ $= \dfrac{\cos^2 x + \sin x \cos x}{\cos x + \sin x}$ $= \dfrac{\cos(\cos x + \sin x)}{\cos x + \sin x}$ $= \cos x$ = LS

Chapter 8

Location	Question	Correct Answer
Getting Started	5a (iv)	$y = \pm\sqrt{x-3} + 4$ (Answer missing in answer key but correct in solutions manual)
Getting Started	6d	4.4×10^{14}
8.1	9c	3
8.2	4 iii (d)	$D = \{x \in \mathbf{R} \mid x > 0\}$, $R = \{y \in \mathbf{R}\}$ (Correct in Solutions Manual)
8.2	5b	$D = \{x \in \mathbf{R} \mid x > 6\}$, $R = \{y \in \mathbf{R}\}$
8.2	8a	$f(x) = -3 \log_{10}\left(\frac{1}{2}(x-5)\right) + 2$
8.2	8b	(25, –1)
8.3	4d	1.40 (Correct in Solutions Manual)
8.3	19a	positive for all values $a > 1$
8.3	19b	negative for all values $0 < a < 1$
8.3	19c	undefined for all values $a \leq 0$
8.3	21b	$y = \log_2 (\frac{x}{3})$
8.3	21c	$y = \log_{0.5} x - 2$
8.3	21d	Insert "$y =$" before given expression.
8.4	3b	$-1 \log_3 7$
8.4	10c	$\log_4 4$; $x = 4$ (Correct in Solutions Manual)
Mid-Chapter Review	13b	0.80
Mid-Chapter Review	13c	3.82
Mid-Chapter Review	13d	1.35
Mid-Chapter Review	13e	1.69
8.5	2a	4.086
8.5	2d	4.090
8.5	14a	$x = 5$ or $x = -1$
8.5	14b	$x = -5$ or $x = -4$
8.6	10	$x = 2$
8.6	11b	$x = 2.15$
8.6	11d	$x = 0.33$
8.7	12a	7.0, 6.7, 6.4, 6.2, 5.9, 5.7, 5.5
8.7	12b	6.2
Chapter Review	7d	log144
Chapter Review	10d	$-3, \frac{1}{2}$
Chapter Self-Test	3b	2

Chapter 9		
Location	**Question**	**Correct Answer**

Getting Started	4f	$x = \pi, \frac{\pi}{6}, \frac{5\pi}{6}$
9.1	2a	Answers may vary. For example, $y = \frac{2 - 0.5x}{x^4 - x^2}$
9.1	2b	Answers may vary. For example, $y = (2x)(\sin(2\pi x))$ (insert graph from 2c)
9.1	2c	Answers may vary. For example, $y = (2x)(\cos(2\pi x))$ (insert graph from 2b)
9.3	5 (4e)	$D = \{x \in \mathbf{R} \mid x \neq 1\}$, $R = \{y \in \mathbf{R}\}$
9.3	5 (4f)	$D = \{x \in \mathbf{R} \mid x > -4\}$, $R = \{y \in \mathbf{R}\}$
9.3	6 (4c)	The function is not symmetric. The function is increasing from $-\infty$ to 0 and from 6 to ∞. zeros at $x = 0, 9$ The relative minimum is at $x = 6$. The relative maximum is at $x = 0$. period: N/A
9.3	6 (4f)	The function is not symmetric. The function is increasing from –4 to ∞. zeros: $x = -3$ maximum/minimum: none period: N/A
9.3	8a	$\left\{x \in \mathbf{Z} \middle\vert x \neq -2, 7, (\frac{2n+1}{2})\pi\right\}$
9.3	8c	$\{x \in \mathbf{Z} \mid x \geq -81 \text{ and } x \neq n\pi\}$
9.4	2d (1f)	domain of $(f \div g)$: $\{x \in \mathbf{R} \mid x > 0, x \neq 1\}$
Mid-Chapter Review	7b	$(f \div g)(x) = \frac{10x}{x^2 - 3}$ $D = \{x \in \mathbf{R} \mid x \neq \pm\sqrt{3}, 0\}$
9.5	6c	$f \circ g = \sqrt{4 - x^4}$ $D = \{x \in \mathbf{R} \mid -\sqrt{2} \leq x \leq \sqrt{2}\}$ $R = \{y \in \mathbf{R} \mid 0 \leq y \leq 2\}$ $g \circ f = 4 - x^2$ $D = \{x \in \mathbf{R} \mid -2 \leq x \leq 2\}$ $R = \{y \in \mathbf{R} \mid 0 \leq y \leq 4\}$
9.5	6d	$f \circ g = 2\sqrt{x-1}$ $D = \{x \in \mathbf{R} \mid x \geq 1\}$ $R = \{y \in \mathbf{R} \mid y \geq 1\}$ $g \circ f = 2\sqrt{x-1}$ $D = \{x \in \mathbf{R} \mid x \geq 0\}$ $R = \{y \in \mathbf{R} \mid y \geq 0\}$
9.5	6e	$f \circ g = x$ $D = \{x \in \mathbf{R} \mid x > 0\}$ $R = \{y \in \mathbf{R} \mid y > 0\}$ $g \circ f = x$ $D = \{x \in \mathbf{R}\}$

		R = $\{y \in \mathbf{R}\}$
9.5	8c	It is vertically stretched by a factor of 2 and translated down 1 unit.
9.5	9a	$f(g(x)) = 6x + 3$ It has been vertically stretched by a factor of 3 and translated up 1 unit.
9.5	9b	$g(f(x)) = 6x - 1$ It has been vertically stretched by a factor of 3.
9.5	16b	$f(k) = 2\sqrt{9k - 16} + 5$
9.6	4	$f(x) < g(x)$: $1.3 < x < 1.6$ $f(x) = g(x)$: $x = 0$ or 1.3 $f(x) > g(x)$: $0 < x < 1.3$ or $1.6 < x \leq 3$
9.6	6e	$x = 0.21$ or 0.72
9.6	9a	$x \in (-0.57, 1)\ (6.33, \infty)$
9.6	9e	$x = 0$ or $x \in [0.35, 1.51]$
9.6	14	$x = 0 \pm 2n$, $x = 0.67 \pm 2n$ or $x = 0.62 \pm 2n$, where $n \in \mathbf{I}$
9.7	11d	$P(65) \approx 10\ 712\ 509$
9.7	15b	exponential or rational
9.7	15c	exponential or rational
Chapter Review	5	The part labeled “d)” should be labeled “c)”.
Chapter Review	11	$f(x) < g(x)$: $-1.06 < x < 0$ or $x > 1.06$ $f(x) = g(x)$: $x = -1.06$, 0, or 1.06 $f(x) > g(x)$: $x < -1.06$ or $0 < x \leq 1.06$
Chapter Review	13a	$P(t) = 600t - 1000$. The slope is the rate that the population is changing. The P-intercept would represent the initial number of frogs.