Week 1

1.1.25. 12, 16, $3a^2-a+2$, $3a^2+a+2$, $3a^2+5a+4$, $6a^2-2a+4$, $12a^2-2a+2$, $3a^4-a^2+2$, $9a^4-6a^3+13a^2-4a+4$, $3a^2+6ah+3h^2-a-h+2$.

1.1.27. $-3-h$.

1.1.29. $\frac{-1}{ax}$.

1.1.31. $(-\infty,-3)\cup(-3,3)\cup(3,\infty)$.

1.1.33. $(-\infty,\infty)$.

1.1.35. $(-\infty,0)\cup(5,\infty)$.

1.1.37. $[0,4]$

1.1.47. $(-\infty,\infty)$.

1.1.49. $(-\infty,\infty)$.

1.1.51. $f(x)=\frac{5}{2}x-\frac{11}{2}$.

1.1.57. $A(L)=10L-L^2$.

1.1.61. $S(x)=x^2+\frac{8}{x}$.

1.1.65. $F(x)=\begin{cases}15(40-x) \text{ if } 0\le x<40\\ 0 \text{ if } 40\le x\le 65\\ 15(x-65) \text{ if } x>65\end{cases}$

1.2.5. $y=2x+b$, $y=mx+1-2m$, and $y=2x-3$.

1.2.7. Slope of -1.

1.2.9. $f(x)=-3x(x+1)(x-2)$.

1.2.17. $P=0.434d+15$, 196 feet.

1.3.1.
- $y=f(x)+3$
- $y=f(x)-3$
- $y=f(x-3)$
- $y=f(x+3)$
- $y=-f(x)$
- $y=f(-x)$
- $y=3f(x)$

1.3.31. $f\circ g(x)=4x^2+4x$, $g\circ f(x)=2x^2-1$, $f\circ f(x)=x^4-2x^2$, and $g\circ g(x)=4x+3$. All four have domain $(-\infty,\infty)$.

1.3.35. $f\circ g(x)=\frac{2x^2+6x+5}{(x+2)(x+1)}$ with domain $x\neq -2,-1$; $g\circ f(x)=\frac{x^2+x+1}{(x+1)^2}$ with domain $x\neq -1$; $f\circ f(x)=\frac{x^4+3x^2+1}{x(x^2+1)}$ with domain $x\neq 0$; $g\circ g(x)=\frac{2x+3}{3x+5}$ with domain $x\neq -2,\frac{-5}{3}$.

1.3.41. $g(x)=2x+x^2$, $f(x)=x^4$.

1.3.43. $g(x)=\sqrt[3]{x}$, $f(x)=\frac{x}{1+x}$.

1.3.45. $g(t) = t^2$, $f(t) = \sec t \tan t$.

1.R.TF1. False.

1.R.TF3. False.

1.R.TF5. True.

1.R.E3. $2a + h - 2$.

1.R.E5. $(-\infty, \frac{1}{3}) \cup (\frac{1}{3}, \infty)$, $(-\infty, 0) \cup (0, \infty)$.

1.R.E9.
- shift upwards 8 units.
- shift left 8 units.
- stretch vertically by a factor of 2, then shift 1 unit upwards.
- shift 2 units to the right and 2 units downwards.
- reflect across the x-axis.
- reflect across the line $y = x$.

Week 2

1.5.1. 4 and $x^{-4/3}$.

1.5.2. 16, and $27x^7$.

1.5.19. $(-\infty, -1) \cup (-1, 1) \cup (1, \infty)$.

1.5.21. $f(x) = 3 \cdot 2^x$.

1.5.29. 3200 and $100 \cdot 2^{t/3}$.

1.6.9. No.

1.6.11. Yes.

1.6.13. No.

1.6.17. 0

1.6.19. $F = \frac{9}{5}C + 32$, which is Fahrenheit temperature written as a function of Celsius temperature.

1.6.21. $y = \frac{1}{3}(x-1)^2 - \frac{2}{3}$, when $x \geq 1$.

1.6.23. $y = \frac{1}{2}(1 + \ln x)$.

1.6.25. $y = e^x - 3$

1.6.35. 3 and -3.

1.6.37. 3 and -2.

1.6.39. $\ln 1215$.

1.6.41. $\ln \frac{\sqrt{x}}{x+1}$

1.6.51. $x = \frac{1}{4}(7 - \ln 6)$.

1.6.53. $5 + \frac{\ln 3}{\ln 2}$.

1.6.57. The domain is $(\ln 3, \infty)$, and its inverse is $\ln(e^x + 3)$.

1.6.61. $f^{-1}(n) = 3\frac{\ln \frac{n}{100}}{\ln 2}$; it represents the time at which there are n bacteria present. $f^{-1}(50000) = 3\frac{\ln 500}{\ln 2} \approx 26.9$ hours.

1.6.63. $\frac{\pi}{3}$ and π.

1.6.65. $\frac{\pi}{4}$ and $\frac{\pi}{4}$.

1.6.67. 10 and $\frac{\pi}{3}$.

1.R.TF7. False.

1.R.TF9. True.

1.R.TF11. False.

1.R.TF13. False.

1.R.23. 1

1.R.25. 9, 2, $\frac{1}{\sqrt{3}}$, $\frac{3}{5}$.