Section 2.3

1 Apply the limit laws as appropriate
(a) -6 (b) -8 (c) 2 (d) -6 (e) The limit does not exist because the denominator approaches 0 while the numerator approaches a non-zero number. (f) 0

2 (a) 1 (b) $\lim_{x\to 0} g(x)$ does not exist because the left and right limits do not agree so $\lim_{x\to 0}[f(x) - g(x)]$ does not exist (c) 2 (d) Limit does not exist because $\lim_{x\to 3^-} \dfrac{f(x)}{g(x)} = \infty$ but $\lim_{x\to 3^+} \dfrac{f(x)}{g(x)} = -\infty$ (e) -4 (f) $f(-1)$ is undefined so $f(-1) + \lim_{x\to -1} g(x)$ is not defined.

5 $\frac{7}{8}$

9 $\frac{3}{2}$

10 (a) The left-hand side of the equation is not defined for $x = 2$, but the right-hand side is. (b) Since the equation holds for all $x \neq 1$, it follows that both sides of the equation approach the same limit as $x \to 2$.

11 4

18 12

22 $\frac{2}{3}$.

30 $-\frac{4}{5}$

32 $-\frac{2}{x^3}$

38 2, by the Squeeze Theorem

50 $\lim_{x\to 1^-} f(x) = \lim_{x\to 1^-} (x^2 + 1) = 2$, $\lim_{x\to 1^+} f(x) = \lim_{x\to 1^+} (x - 2) = 1$ (b) Since the left-hand and right-hand limits of f at $x = 1$ are not equal, $\lim_{x\to 1} f(x)$ does not exist.