2.2.2)

a) $\lim_{x\to 2} f(x) + \lim_{x\to 2} g(x) = 0 + 0 = 0$

b) $\lim_{x\to 0} f(x) + \lim_{x\to 2} g(x) = \text{DNE} + 2 \rightarrow \text{DNE}$

c) $\lim_{x\to 0^+} f(x) + \lim_{x\to 0^+} g(x) = -2 + 2 = 0$

d) $\lim_{x\to 0^-} f(x) + \lim_{x\to 0^-} g(x) = 1 + 2 = 3$

e) $\lim_{x\to 2} \frac{f(x)}{1+g(x)} = \frac{\lim_{x\to 2} f(x)}{\lim_{x\to 2} g(x) + 1} = \frac{0}{1+0} = 0$

2.2.2) (f) $\lim_{x\to 2} \frac{1+g(x)}{f(x)} = \frac{1+0}{0} \Rightarrow$ DNE

(g) $\lim_{x\to 0^+} \sqrt{f(x)} = \sqrt{-2} \Rightarrow$ DNE

(h) $\lim_{x\to 0^-} \sqrt{f(x)} = \sqrt{1} = 1$

2.2.6) $\lim_{x\to 3} \frac{x^3-2x}{x+1} = \frac{(3)^3-2(3)}{3+1} = \frac{3}{4}$

2.2.8) $\lim_{x\to 0} \frac{6x-9}{x^2-12x+3} = \frac{6(0)-9}{0^2-12(0)+3} = -\frac{9}{3} = -3$

2.2.10) $\lim_{t\to -2} \frac{t^3+8}{t+2} = \lim_{t\to -2} \frac{(t+2)(t^2-2t+4)}{t+2} = \lim_{t\to -2} t^2-2t+4 = 4+4+4=12$

2.2.18) $\lim_{x\to\infty} \frac{5x^2+7}{3x^2-x} = \lim_{x\to\infty} \frac{5x^2/x^2 + 7/x^2}{3x^2/x^2 - x/x^2} = \lim_{x\to\infty} \frac{5+7/x^2}{3-1/x} = 5/3$

2.2.52) (a) $F(-3) = k = \lim_{x\to -3} \frac{x^2-9}{x+3} = \lim_{x\to -3} \frac{(x+3)(x-3)}{x+3} = \lim_{x\to -3} x-3 = -6$

(b) Since we have "filled in" the hole at $x=-3$,
$F(x) = x-3$

2.2.54) $\lim_{x\to 0^-} \left(\frac{1}{x} + \frac{1}{x^2}\right) = \lim_{x\to 0^-} \left(\frac{x+1}{x^2}\right)$

Intuitively, we see that the numerator is positive and is getting very close to 1. Meanwhile, the denominator is positive and getting very close to 0. So the limit is $+\infty$