① a) $\lim_{x\to 0} \dfrac{\frac{2}{x+2} - 1}{x}$ $\cdot (x+2)$

$\lim_{x\to 0} \dfrac{2 - x - 2}{x(x+2)}$

$\lim_{x\to 0} \dfrac{-x}{x(x+2)} = \dfrac{-1}{2}$

b) $\lim_{x\to\infty} \dfrac{(2-3x^2)^2}{6x^4 - 7x^3 - 5}$

$\lim_{x\to\infty} \dfrac{(2-3x^2)(2-3x^2)}{6x^4 - 7x^3 - 5}$

$\lim_{x\to\infty} \dfrac{4 - 12x^2 + 9x^4}{6x^4 - 7x^3 - 5} = \dfrac{9}{6} = \dfrac{3}{2}$

c) $\lim_{x\to 1} \dfrac{(x+2)^3 - 27}{x-1}$ ← diff of cubes

$x+2-3$

$\lim_{x\to 1} \dfrac{[(x+2)-3][(x+2)^2 + 3(x+2) + 9]}{x-1}$

$\lim_{x\to 1} \dfrac{[x-1][(x+2)^2 + 3(x+2) + 9]}{x-1} = 9+9+9 = 27$

d) $\lim_{x\to 7} \dfrac{(\sqrt{x+9} - 4)(\sqrt{x+9} + 4)}{(x-7)(\sqrt{x+9} + 4)}$

$\lim_{x\to 7} \dfrac{x+9-16}{(x-7)(\sqrt{x+9} + 4)}$

$\lim_{x\to 7} \dfrac{x-7}{(x-7)(\sqrt{x+9} + 4)} = \dfrac{1}{8}$

① e) $\lim_{x\to\infty} \frac{4x+7}{3x^2-2} = 0$ (Bigger on bottom)

f) $\lim_{x\to 4} \frac{x^2-10x+24}{x^2-16}$ ← Simple trinomial: $-6 + -4 = -10$, $-6 \times -4 = 24$

← diff of squares

$\lim_{x\to 4} \frac{(x-6)(x-4)}{(x+4)(x-4)} = \frac{-2}{8} = \frac{-1}{4}$

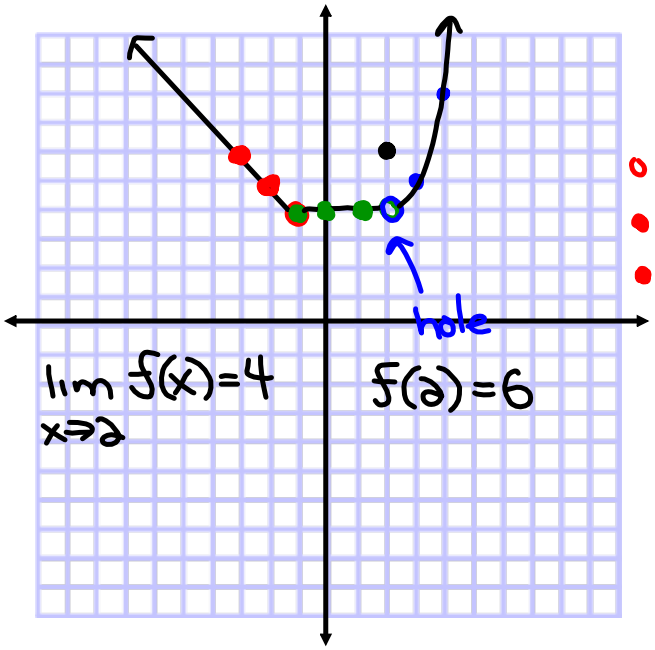
g) $\lim_{h\to 0} \frac{(h-2)^2-4}{h}$ ← diff of squares

$\lim_{h\to 0} \frac{[(h-2)+2][(h-2)-2]}{h}$

$\lim_{h\to 0} \frac{h(h-4)}{h} = -4$

h) $\lim_{x\to -2} 5x^2-3x+6 = 20+6+6 = 32$

② $f(x) = \begin{cases} 3-x, & x<-1 \\ 4, & -1 \le x < 2 \\ 6, & x = 2 \\ (x-2)^2+4, & x>2 \end{cases}$



$\lim_{x \to 2} f(x) = 4$ $f(2) = 6$

$3-x$

x	y
-1	4
-2	5
-3	6

4

x	y
-1	4
0	4
1	4
2	4

6

x	y
2	6

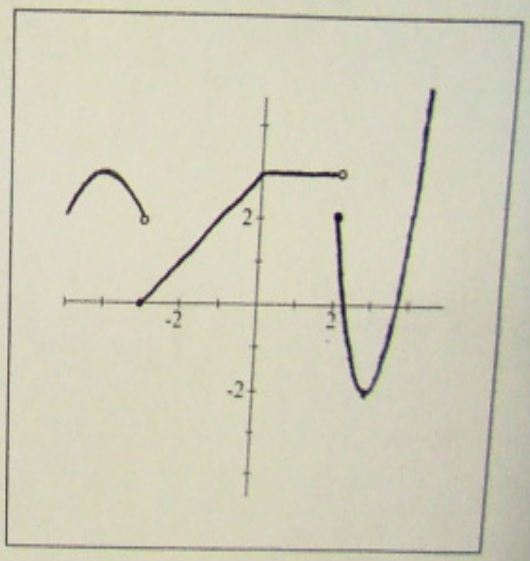
$(x-2)^2+4$

x	y
2	4
3	5
4	8

Discontinuous @ $x=2$

$\lim_{x \to 2} f(x) \neq f(2)$

3. The following is a graph of $f(x)$:



Evaluate each of the following:

(a) $\lim_{x \to -3^+} f(x) =$ 0 (b) $\lim_{x \to -3^-} f(x) =$ 2

(c) $f(-3) =$ 0 closed dot (d) $\lim_{x \to 2^-} f(x) =$ 3

(e) $\lim_{x \to 2^+} f(x) =$ 2 (f) $f(2) =$ 2 closed dot

(g) $\lim_{x \to 3} f(x) =$ -2 (h) $f(3) =$ -2

i) $\lim_{x \to -3} f(x) =$ DNE