

(1)

MATH 1210: HOMEWORK SOLUTIONS §1.1

$$1. \lim_{x \rightarrow 3} (x-5) = 3-5 = \boxed{-2}$$

$$3. \lim_{x \rightarrow -2} (x^2 + 2x - 1) = (-2)^2 + 2(-2) - 1 = \boxed{-1}$$

$$5. \lim_{t \rightarrow -1} t^2 - 1 = (-1)^2 - 1 = \boxed{0}$$

$$7. \lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2} = \lim_{x \rightarrow 2} \frac{(x+2)(x-2)}{x-2} = \lim_{x \rightarrow 2} x+2 = 2+2 = \boxed{4}$$

$$9. \lim_{x \rightarrow -1} \frac{x^3 - 4x^2 + x + 6}{x+1} = \lim_{x \rightarrow -1} \frac{(x+1)(x^2 - 5x + 6)}{(x+1)}$$

$$= \lim_{x \rightarrow -1} (x^2 - 5x + 6)$$

$$= (-1)^2 - 5(-1) + 6 = \boxed{12}$$

$$11. \lim_{x \rightarrow -t} \frac{x^2 - t^2}{x+t} = \lim_{x \rightarrow -t} \frac{(x+t)(x-t)}{x+t} = \lim_{x \rightarrow -t} x-t$$

$$= -t - t = \boxed{-2t}$$

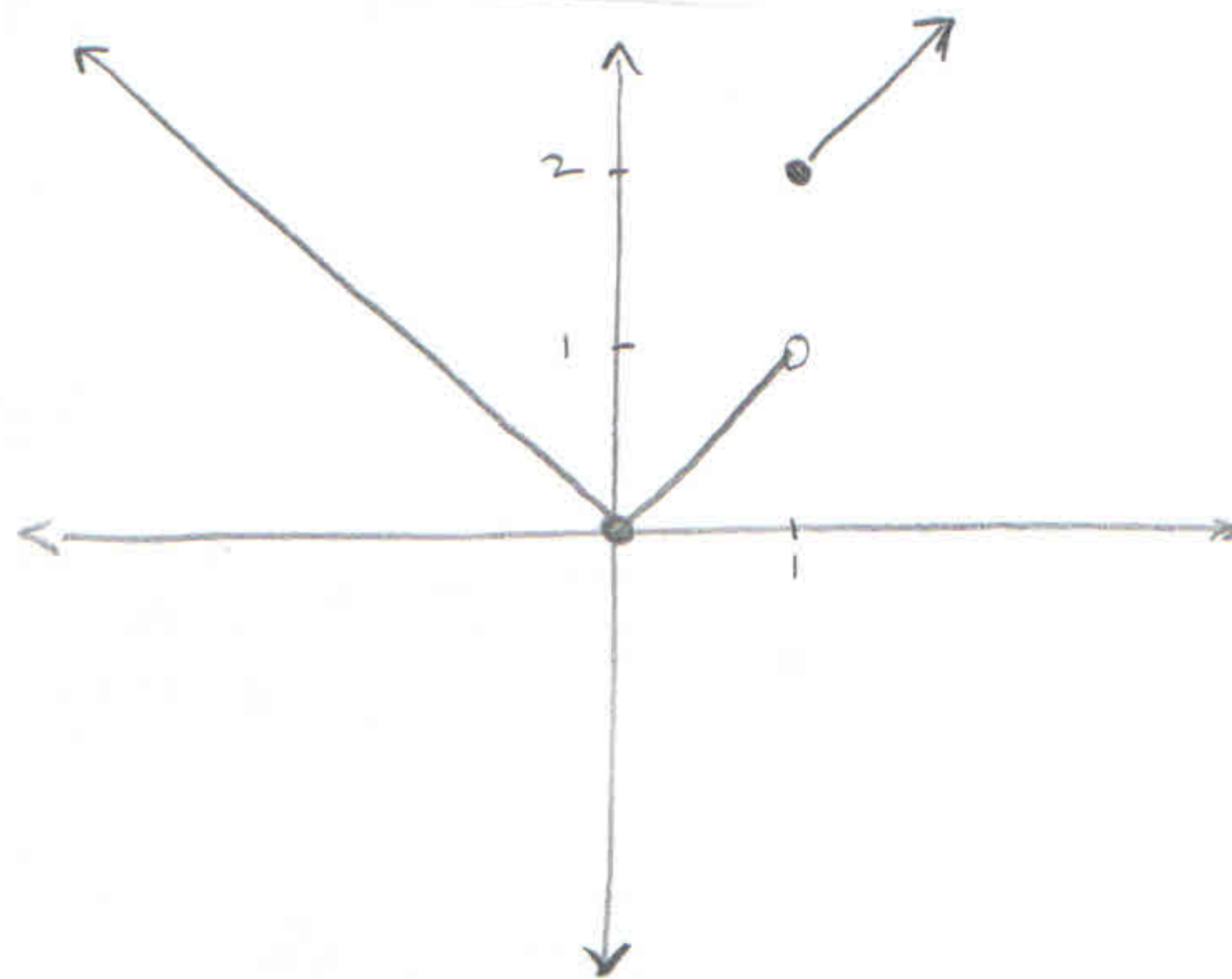
$$13. \lim_{t \rightarrow 2} \frac{\sqrt{(t+4)(t-2)^4}}{(3t-6)^2} = \lim_{t \rightarrow 2} \frac{\sqrt{t+4} (t-2)^2}{9(t-2)^2}$$

$$= \lim_{t \rightarrow 2} \frac{\sqrt{t+4}}{9} = \frac{\sqrt{2+4}}{9} = \boxed{\frac{\sqrt{6}}{9}}$$

$$\begin{aligned}
 15. \quad \lim_{x \rightarrow 3} \frac{x^4 - 18x^2 + 81}{(x-3)^2} &= \lim_{x \rightarrow 3} \frac{(x^2 - 9)^2}{(x-3)^2} \\
 &= \lim_{x \rightarrow 3} \frac{[(x+3)(x-3)]^2}{(x-3)^2} \\
 &= \lim_{x \rightarrow 3} (x+3)^2 = 6^2 = \boxed{36}
 \end{aligned}$$

$$\begin{aligned}
 17. \quad \lim_{h \rightarrow 0} \frac{(2+h)^2 - 4}{h} &= \lim_{h \rightarrow 0} \frac{4 + 4h + h^2 - 4}{h} \\
 &= \lim_{h \rightarrow 0} 4 + h = 4 + 0 = \boxed{4}
 \end{aligned}$$

$$33. \quad f(x) = \begin{cases} -x & x < 0 \\ x & 0 \leq x < 1 \\ 1+x & x \geq 1 \end{cases}$$



$$a) \lim_{x \rightarrow 0} f(x) = 0$$

$$b) \lim_{x \rightarrow 1} f(x) = \text{DNE}$$

$$c) f(1) = 1 + 1 = 2$$

$$d) \lim_{x \rightarrow 1^+} f(x) = 2$$

$$\begin{aligned}
 38. \quad \lim_{x \rightarrow 0} \frac{\sqrt{x+2} - \sqrt{2}}{x} &= \lim_{x \rightarrow 0} \frac{\sqrt{x+2} - \sqrt{2}}{x} \left(\frac{\sqrt{x+2} + \sqrt{2}}{\sqrt{x+2} + \sqrt{2}} \right) \\
 &= \lim_{x \rightarrow 0} \frac{x+2-2}{x(\sqrt{x+2} + \sqrt{2})} \\
 &= \lim_{x \rightarrow 0} \frac{1}{\sqrt{x+2} + \sqrt{2}} = \frac{1}{\sqrt{2} + \sqrt{2}} = \frac{1}{2\sqrt{2}} = \boxed{\frac{\sqrt{2}}{4}}
 \end{aligned}$$