1.6 Determine whether the function is continuous.

1) $f(x) = 5x^3 - x^2 + 2$ Continuous – polynomial

3) $f(x) = \frac{1}{x^2-4}$ $x^2 - 4 = 0$

$x^2 = 4$

$x = \pm 2$

Not continuous. <divide by 0>

15) $f(x) = x^2 - 2x + 1$ polynomial Continuous on $(-\infty, \infty)$

35) $x^2 - 4x - 5$ polynomial - Continuous

37) $f(x) = \frac{1}{x-2}$ on $[1, 4]$

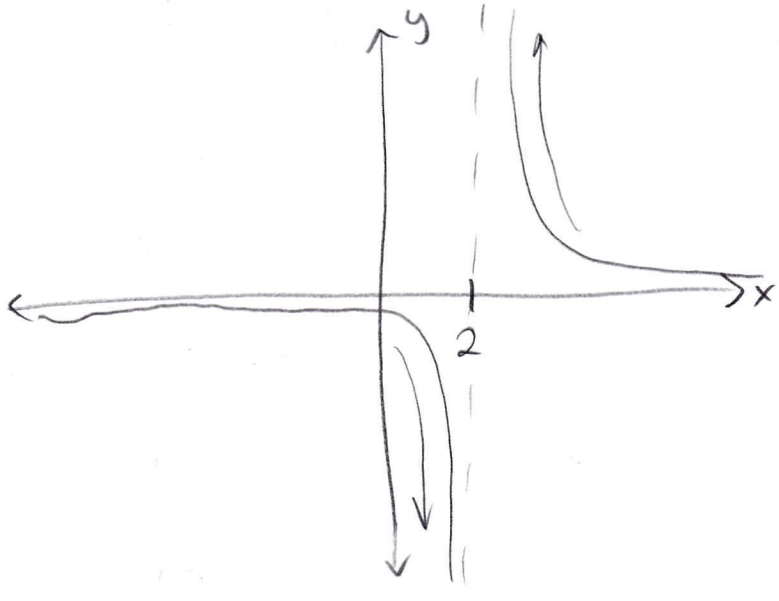
discontinuity at $x = 2$

$x - 2 = 0$

$x = 2$

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

$\lim_{x \to 4^-} \left(\frac{1}{x-2}\right) = \frac{1}{4-2} = \frac{1}{2}$



$\frac{1}{x-2}$

$\sqrt[6]{x-2}$

46)

$$f(x) = \begin{cases} 2 & x \le -1 \\ ax+b & -1 < x < 3 \\ -2 & x \ge 3 \end{cases}$$

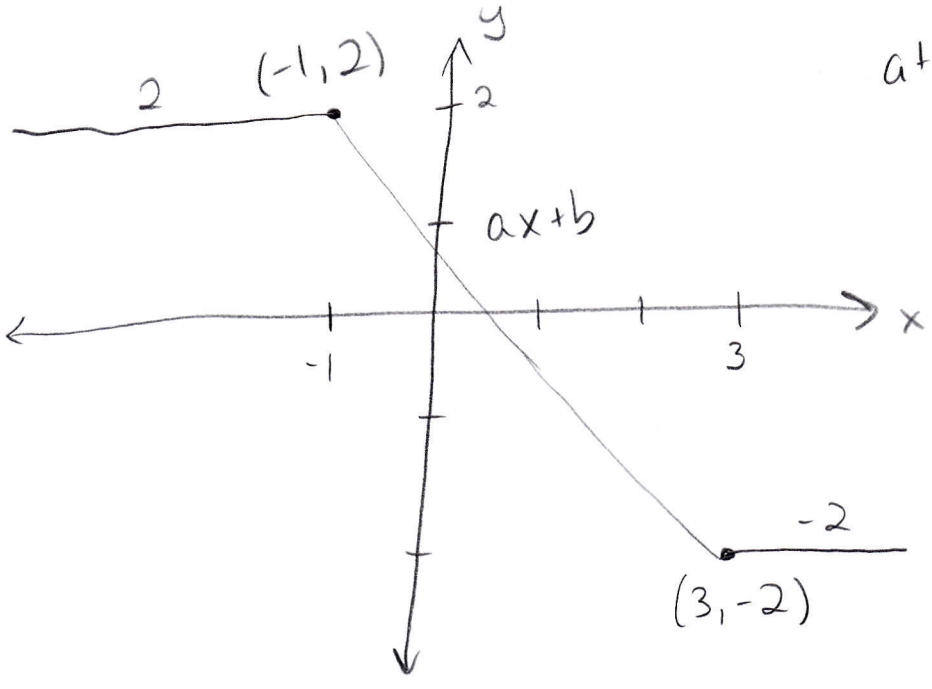
$(-\infty, 1]$

$(1, 3)$

$[3, \infty]$

$x = 1$

$x = 3$



at $x = -1$

$ax + b = 2$

at $x = 3$

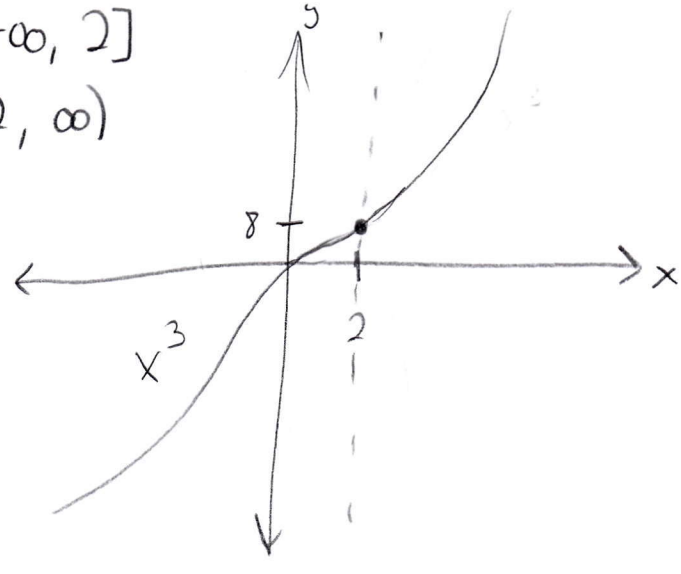
$ax + b = -2$

$a(-1) + b = 2$

$a(3) + b = -2$

45)

$$f(x) = \begin{cases} x^3 & x \le 2 \quad (-\infty, 2] \\ ax^2 & x > 2 \quad (2, \infty) \end{cases}$$



At $x = 2$

$x^3 = 2^3 = 8$

$\lim_{x \to 2^+} ax^2 = 8$

$ax^2 = 8$ at $x = 2$

$a(2^2) = 8$

$4a = 8$

$a = 2$