Find the values to make the function continuous

1

$$f(x) = \begin{cases} 7x - 2 & \text{if } x \le 1 \\ ax^2 & \text{if } x > 1 \end{cases}$$

2

$$f(x) = \begin{cases} ax^2 & \text{if } x \le 2 \\ 2x + a & \text{if } x > 2 \end{cases}$$

$a = 4/3$

3

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

4

$$h(x) = \begin{cases} 2x & \text{if } x < 1 \\ cx^2 + d & \text{if } 1 \le x \le 2 \\ 4x & \text{if } x > 2 \end{cases}$$

$c = 2,\ d = 0$

5

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

$a = -1,\ b = -4$

6

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

$a = 4,\ b = 3$

7

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

$a = 2$

8

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

$a = -1,\ b = 1$

9

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

$a = 4,\ b = 3$

① $f(x) = \begin{cases} 7x-2 & \text{if } x \le 1 \\ ax^2 & \text{if } x > 1 \end{cases}$

for x

Substitute 1 into both expressions & set them equal to each other

$$7(1) - 2 = a(1)^2$$

Solve for a:

$$7 - 2 = a$$

$$\boxed{a = 5}$$

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

$1 + 1 = a(1) + b$

$2 = a + b$

$\downarrow$

$a = 2 - b$

$a(2) + b = 3(2)$

$2a + b = 6$

$\longrightarrow 2(2-b) + b = 6$

$4 - 2b + b = 6$

$4 - b = 6$

$-b = 2$

$\boxed{b = -2}$

$a = 2 - (-2)$

$\boxed{a = 4}$