State the **type** and **x-value** of any discontinuities in the functions below, or write **continuous** if the function has no discontinuities.

1) $f(x) = \dfrac{-3}{(x-3)(x+1)}$

2) $f(x) = \dfrac{(x+2)(x-7)}{x+2}$

3) $f(x) = \dfrac{x^3 - 2x - 1}{x+1}$

4) $f(x) = \dfrac{x^2 + 10x + 25}{2x^2 + 10x}$

5) $f(x) = \begin{cases} -\dfrac{1}{2}x^3 + x & (x < -2) \\ x^2 + 2 & (x \geq -2) \end{cases}$

6) $f(x) = \begin{cases} \dfrac{x-5}{x} & (x \leq 1) \\ x - 5 & (x > 1) \end{cases}$

7) Fill in the domains for the piecewise function so that the function is continuous.

$$f(x) = \begin{cases} x^2 - 9x + 5 & x < \rule{1.5cm}{0.4pt} \\ x^2 - 5x + 1 & x \geq \rule{1.5cm}{0.4pt} \end{cases}$$

Functions f(x) and function g(x) below have the same "ingredients", but the domains are different, which often results in very different functions!

State the **type** and **x-value** of any discontinuities in the functions below, or write **continuous** if the function has no discontinuities.

8) Function *f(x)*

$$f(x) = \begin{cases} \dfrac{6x}{x^2+3x} & (x<3) \\ \dfrac{1}{3}x & (x\geq 3) \end{cases}$$

9) Function *g(x)*

$$g(x) = \begin{cases} \dfrac{6x}{x^2+3x} & (x<-1) \\ \dfrac{1}{3}x & (x\geq -1) \end{cases}$$

10) What value of "c" makes h(x) a continuous function?

$$h(x) = \begin{cases} \dfrac{2x^2+5x-3}{x+3}, & x\neq -3 \\ c, & x=-3 \end{cases}$$

11) The graph of f(x) is shown below. Complete the equation of function f(x) shown in factored form.

$$f(x) = \frac{(x-2)(\qquad)}{(\qquad)(\qquad)}$$