

9. [8 points] The function  $r(x)$  is given by the following formula, where  $c$  is a positive constant:

$$r(x) = \begin{cases} \frac{3x+3}{(x+5)(x-2)} & x < 0 \\ \frac{c}{x^3-1} & 0 \leq x < 4 \\ \sqrt{2-\frac{8}{x}} & 4 \leq x. \end{cases}$$

It is not necessary to show work in this problem.

- a. [2 points] Find  $\lim_{x \rightarrow -\infty} r(x)$ . If the limit does not exist (including the case of limits that diverge to  $\infty$  or  $-\infty$ ), write DNE.

**Answer:**  $\lim_{x \rightarrow -\infty} r(x) =$  \_\_\_\_\_

- b. [2 points] For what value(s) of  $x$  does  $r(x)$  have a vertical asymptote? Write NONE if there are no such values.

**Answer(s):**  $x =$  \_\_\_\_\_

- c. [2 points] For what value(s) of  $x$  is  $r(x) = 0$ ? Write NONE if there are no such values.

**Answer(s):**  $x =$  \_\_\_\_\_

- d. [2 points] For what value(s) of  $c$  is the function  $r(x)$  continuous at  $x = 0$ ? Write NONE if there are no such values.

**Answer(s):**  $c =$  \_\_\_\_\_