8. [4 points] Recall from Team HW 2 that if the function $f(x)$ is not defined at a, we say that $f(x)$ can be *continuously extended* to a if there is a number c such that the piecewise defined function

$$F(x) = \begin{cases} f(x) & x \neq a \\ c & x = a \end{cases}$$

is continuous at a. Write down a formula for a rational function $r(x)$ that satisfies all of the following conditions, or, if no such rational function exists, write DNE:

- the domain of $r(x)$ is all real numbers except for 0 and 3;
- $r(x)$ can be continuously extended to 0;
- $r(x)$ *cannot* be continuously extended to 3.

Solution: The simplest solution is $r(x) = \dfrac{x}{x(x-3)}$, although many other rational functions will work too. The important thing is that both x and $x-3$ appear as factors in the denominator, the exponent on x is at least as big in the numerator as it is in the denominator, and the exponent on $(x-3)$ is bigger in the denominator than in the numerator.

Answer: $r(x) =$ $\dfrac{x}{x(x-3)}$