1.6 Continuity

1. Determine all of the values of *x* for which the function is continuous. Be sure to explain your reasoning:
   a. $f(x) = 4x^5 - 7x^3 - 5$
   b. $g(x) = \dfrac{2x^2 + x - 5}{2x - 6x^2}$
   c. $h(x) = \sqrt{5 - x}$
   d. $f(x) = \dfrac{3x^2 - 27}{x^2 + 1}$

2. Determine all the values of *x* where the function is continuous. Explain (using limits will be necessary to your explanation!):
$$f(x) = \begin{cases} 3x^2 - 5x + 1, & x < 1 \\ -\dfrac{2}{x+1}, & x \geq 1 \end{cases}$$

3. The given function is known to be continuous. Determine the value of *k*:
$$g(x) = \begin{cases} 2x - 5, & x \leq 4 \\ \sqrt{x + 2k}, & x > 4 \end{cases}$$

4. Using interval notation state where the *signum* function is continuous. Sketch the function:
$$s(x) = \begin{cases} -1, & x < 0 \\ 0, & x = 0 \\ 1, & x > 0 \end{cases}$$
(Note that *signum* has the word *sign* as its root)