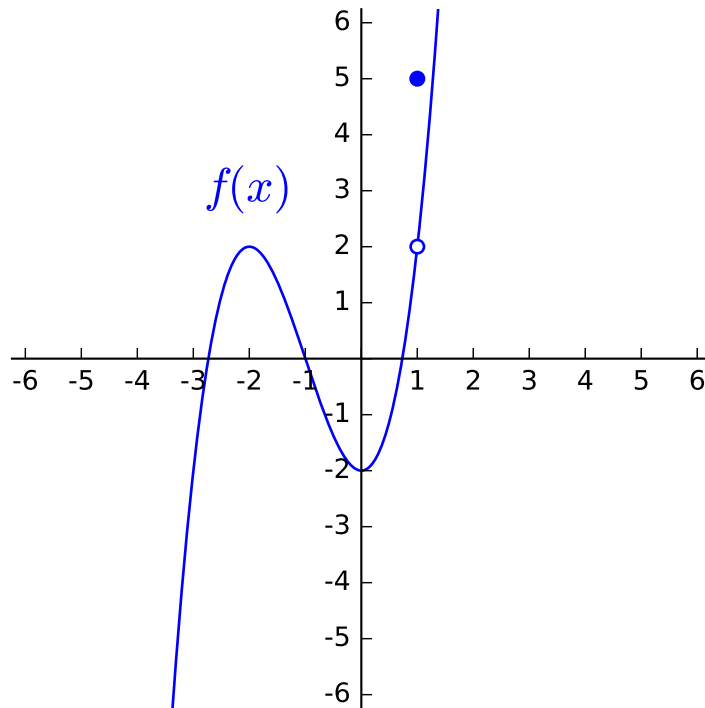*Snow Day Assignment* Name: _____

All work on this lab should be original effort from you. Although I encourage collaboration on this assignment, the work performed herein should be your own. Technology allowed on this lab includes: Desmos (`https://www.desmos.com/calculator`) and an approved TI calculator. This lab has 5 questions for a total of 0 points.

1. Below is the graph of $f(x)$.

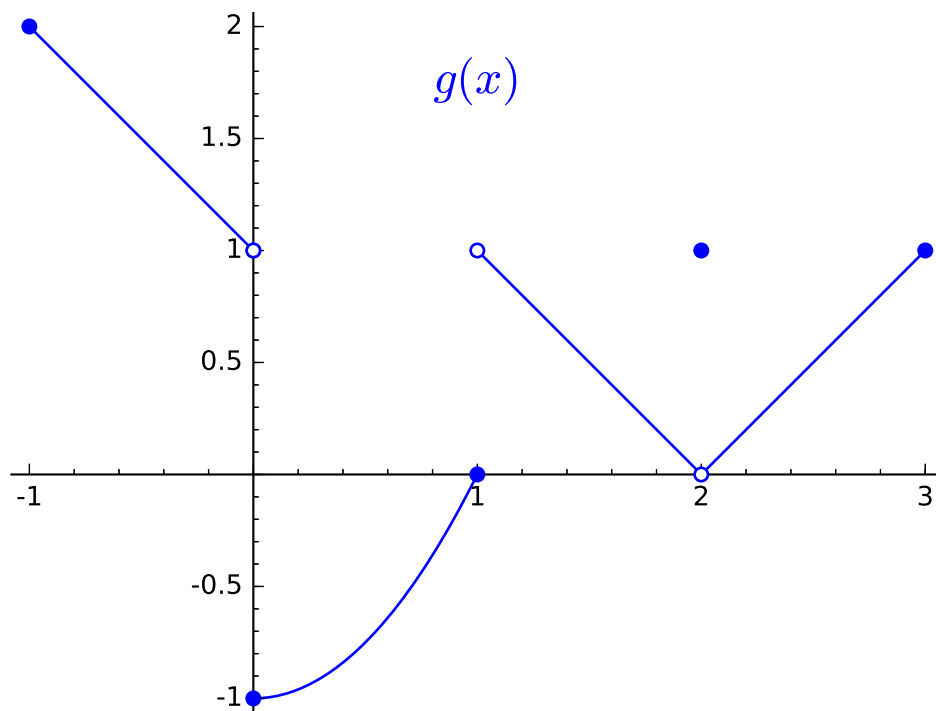Find the value of the following limits. If the limit does not exist, write DNE.

(a) $\displaystyle\lim_{x \to -2} f(x) =$ ___**2**___

(b) $\displaystyle\lim_{x \to 1^+} f(x) =$ ___**2**___

(c) $\displaystyle\lim_{x \to 1^-} f(x) =$ ___**2**___

(d) $\displaystyle\lim_{x \to 1} f(x) =$ ___**2**___

2. Below is the graph of $g(x)$.

Find the value of the following limits. If the limit does not exist, write DNE.

(a) $\lim\limits_{x \to -1^+} f(x) =$ __**2**__

(b) $\lim\limits_{x \to -1^-} f(x) =$ __**DNE**__

(c) $\lim\limits_{x \to -1} f(x) =$ __**DNE**__

(d) $\lim\limits_{x \to 0^+} f(x) =$ __**-1**__

(e) $\lim\limits_{x \to 0^-} f(x) =$ __**1**__

(f) $\lim\limits_{x \to 0} f(x) =$ __**DNE**__

(g) $\lim\limits_{x \to 1^+} f(x) =$ __**1**__

(h) $\lim\limits_{x \to 1^-} f(x) =$ __**0**__

(i) $\lim\limits_{x \to 1} f(x) =$ __**DNE**__

(j) $\lim\limits_{x \to 2^+} f(x) =$ __**0**__

(k) $\lim\limits_{x \to 2^-} f(x) =$ __**0**__

(l) $\lim\limits_{x \to 2} f(x) =$ __**0**__

(m) What is the value of $f(0)$? __**-1**__

(n) What is the value of $f(1)$? __**0**__

(o) What is the value of $f(2)$? __**1**__

3. Write the definition of $\lim\limits_{x \to \frac{\pi}{4}} \cos(x) = \dfrac{\sqrt{2}}{2}$ using the formal epsilon-delta form of the definition of a limit.

> **Solution:** For all $\varepsilon > 0$, there exists a $\delta > 0$ such that if $x \in \left(\frac{\pi}{4} - \delta, \frac{\pi}{4}\right) \cup \left(4, \frac{\pi}{4} + \delta\right)$, then $\cos(x) \in \left(\frac{\sqrt{2}}{2} - \varepsilon, \frac{\sqrt{2}}{2}\right)$.

4. Write the solution set, in interval notation, of the following absolute value inequalities.

   (a) $0 < |x - 2| < 0.5$

   > **Solution:** $(1.5, 2) \cup (2, 2.5)$

   (b) $0 < |x + 5| < 0.25$

   > **Solution:** $(-5.25, -5) \cup (-5, -4.75)$

   (c) $|x^2 - 4| < 1$

   > **Solution:** $\left(\sqrt{3}, \sqrt{5}\right)$

5. Describe, via a graph and a mathematical expression, the punctured interval around $x = 2$ with a radius of 0.1.

> **Solution:** The punctured interval would be given by $0 < |x - 2| < 0.1$.
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