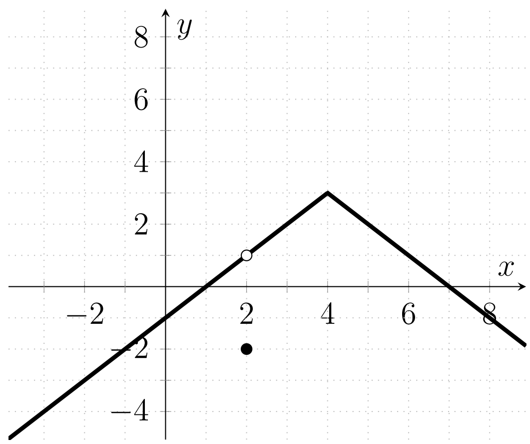
Name: ______________ Academic Integrity Signature: ______________

I have abided by the UNCG Academic Integrity Policy.

Note: Correct numerical answers without justification will receive little or no credit.

1. (3 points) The graph of $y = f(x)$ is shown below. Compute $\lim_{x\to 2} f(x)$, or explain why it does not exist.



Solution: Notice that the height of the graph approaches 1 as the x approaches 2 from either side. (The actual value of $f(2)$ does not affect the limit.) Thus $\lim_{x\to 2} f(x) = 1$.

2. (2 points) Compute $\lim_{x\to 1} \frac{x^2 + x - 2}{x - 1}$.

Solution:

$$\lim_{x\to 1} \frac{x^2 + x - 2}{x - 1} = \lim_{x\to 1} \frac{(x+2)\cancel{(x-1)}}{\cancel{(x-1)}} = \lim_{x\to 1}(x+2) = 3.$$

3. (2 points) Compute $\lim_{x\to 1} \frac{x^2 + x - 2}{x + 1}$.

Solution:

$$\lim_{x\to 1} \frac{x^2 + x - 2}{x + 1} = \frac{1^2 + 1 - 2}{1 + 1} = 0.$$

 Points earned: ______ out of 7.

4. (3 points) (Precise definition of limit) Let $f(x)$ be defined on an open interval containing x_0, except possibly at x_0 itself. We say that the *limit of* $f(x)$ *as* x *approaches* x_0 *is* L, denoted $\lim_{x \to x_0} f(x) = L$, if

Solution: for every $\epsilon > 0$, there exists $\delta > 0$ such that for all $x \neq x_0$,

$$0 < |x - x_0| < \delta \implies |f(x) - L| < \epsilon.$$

Points earned: ______ out of 3.