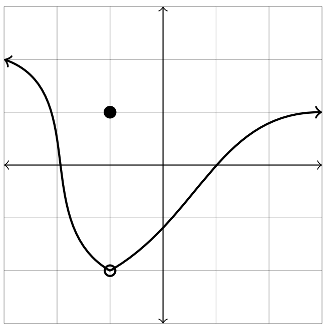
Name: ______________ Academic Integrity Signature: ______________

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

1. (5 points) The graph of $y = f(x)$ is shown below. Compute $\lim_{x \to -1} f(x)$, or explain why it does not exist.



Solution: Recall that when we are computing a limit as x approaches x_0, we do not care about the actual value of the function at x_0. We just look at what happens "nearby".

$$\lim_{x \to -1} f(x) = -2.$$

2. (5 points) ($\epsilon - \delta$ definition) 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: given $\epsilon > 0$, there exists $\delta > 0$ such that whenever $0 < |x - x_0| < \delta$, we have $|f(x) - L| < \epsilon$.

3. (5 points) Compute $\lim_{t \to 0} \frac{\sin(\pi t)}{t}$.

Solution: Recall that we proved in class that $\lim_{\theta} \frac{\sin(\theta)}{\theta} = 1$. To compute given limit, multiply the numerator and denominator by π

$$\begin{aligned}
\lim_{t \to 0} \frac{\sin(\pi t)}{t} &= \lim_{t \to 0} \frac{\pi \sin(\pi t)}{\pi t} \\
&= \pi \lim_{t \to 0} \frac{\sin(\pi t)}{\pi t} \\
&= \pi \cdot 1 \\
&= \pi.
\end{aligned}$$

 Points earned: ______ out of 15.