Name: Key **Date** _____

Instructions: For each question, neatly write a solution and circle your answer.

1. Evaluate $\lim_{x\to 0} \dfrac{1-\cos(x)}{x}$.

$\lim_{x\to 0} \dfrac{1-\cos(x)}{x} = \lim_{x\to 0} \dfrac{\sin(x)}{1} = \sin(0) = 0$

2. Sketch a graph of the function $f(x)$ that has the following properties:

- $f(x)$ is continuous on $(-\infty,-2)\bigcup(-2,\infty)$
- $f(x)$ has a vertical asymptote $x=-2$
- $\lim_{x\to\infty} f(x) = -1$ and $\lim_{x\to-\infty} f(x) = 3$
- $f(x)$ is increasing on $(-\infty,-2)\bigcup(-2,5)$
- $f(x)$ is decreasing on $(5,\infty)$
- $f(x)$ has a local maximum at $(5,6)$ and no local minimums
- $f(x)$ is concave upward on $(-\infty,-2)\bigcup(8,\infty)$
- $f(x)$ is concave downward on $(-2,8)$
- $f(x)$ has an inflection point $(8,2)$