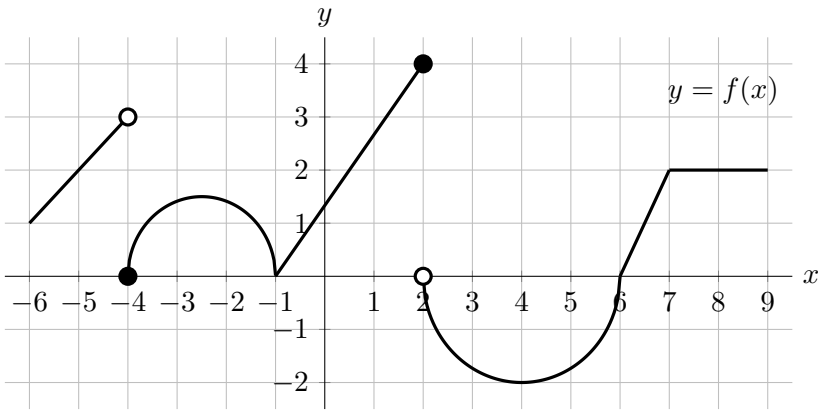
1. [10 points] The graph of $f(x)$ shown below consists of lines and semicircles.



For the following problems, you do not need to show work. If there is not enough information, write "NEI".

a. [2 points] For which values of $-6 < x < 9$ is the function $f(x)$ discontinuous?

Solution: $x = -4$ and $x = 2$.

b. [2 points] For which values of $0 < x < 9$ does $f(x)$ appear to not be differentiable?

Solution: $x = 2$, 6 and 7.

c. [2 points] Find $\lim_{h \to 0^-} f(-4+h) - f(-4)$.

Solution: $\lim_{h \to 0^-} f(-4+h) - f(-4) = 3$.

d. [2 points] Find $\lim_{x \to \infty} f\left(\frac{2x}{x+1}\right)$.

Solution: $\lim_{x \to \infty} f\left(\frac{2x}{x+1}\right) = 4$

e. [2 points] Let $g(x) = \ln(4 + f(x))$. Find $g'(6.5)$.

Solution: $g'(x) = \frac{f'(x)}{4+f(x)}$, then $g'(6.5) = \frac{f'(6.5)}{4+f(6.5)} = \frac{2}{5}$

