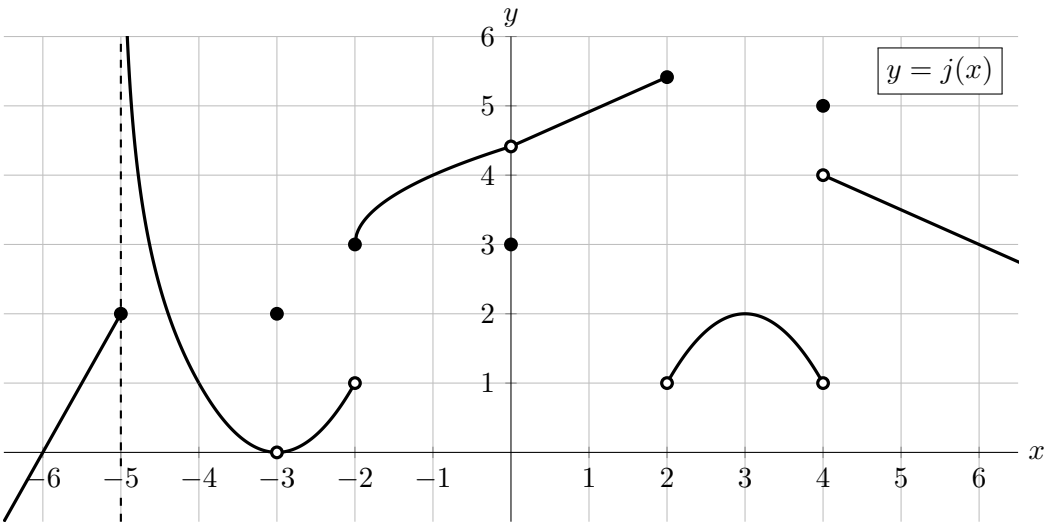
1. [11 points] Below is a portion of the graph of the function $j(x)$. Note that $j(x)$ has a vertical asymptote at $x = -5$, and is linear on the intervals $(-6, -5)$, $(0, 2)$, and $(4, 6)$.



a. [1 point] At which of the following values of x is the function $j(x)$ continuous? Circle all correct answers.

$x = -3$ $x = -2$ $x = 3$ $x = 4$ NONE OF THESE

b. [6 points] Find the **exact** numerical value of each expression below, if possible. For any values that do not exist, including if they are limits that diverge to $\pm\infty$, write DNE.

i. $\lim_{x\to 3} j(x) =$ _____

ii. $\lim_{x\to -3} j(x) =$ _____

iii. $\lim_{x\to 4} j(x) =$ _____

iv. $\lim_{x\to 0} \dfrac{j(5+x) - j(5)}{x} =$ _____

v. $\lim_{x\to 2^+} j(x) =$ _____

vi. $\lim_{x\to -5^+} \dfrac{1}{j(x)} =$ _____

c. [2 points] Consider the function $k(x) = 2 \cdot j\left(\frac{1}{2}(x-9)\right) + 1$. Which of the following must be a vertical asymptote of $k(x)$? Circle the one correct answer.

$x = -9$ $x = -5$ $x = -3$ $x = -1$ $x = 1$

d. [2 points] Given that $j'(-4) = -2$, find an equation of the line tangent to the graph of $j(x)$ at the point $(-4, 1)$.

Answer: _____