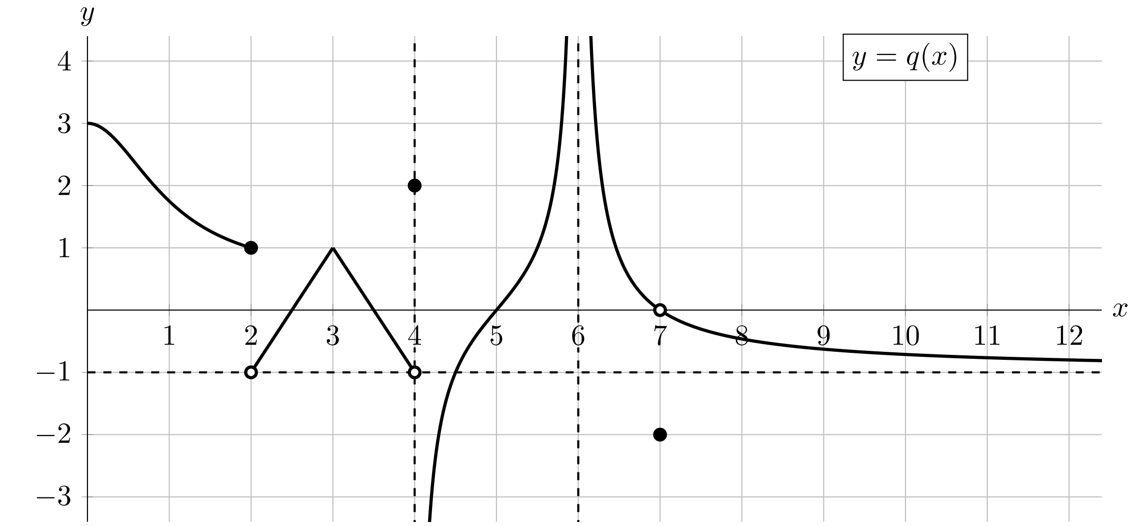
2. [9 points] Below is a portion of the graph of the **even** function $q(x)$. Note that $q(x)$ is linear on the intervals $(2,3)$ and $(3,4)$, and has vertical asymptotes at $x = 4$ and $x = 6$ and a horizontal asymptote at $y = -1$.



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

$x = 2$ $\boxed{x = 3}$ $\boxed{x = 5}$ $x = 6$ $x = 7$ 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. If there is not enough information to find a given value or determine whether it exists, write NEI. Remember that $q(x)$ is an **even** function, and $\pi \approx 3.14$.

i. $\lim_{x\to 7} q(x) =$ 0

ii. $\lim_{x\to 2} q(x) =$ **DNE**

iii. $\lim_{h\to 0} \dfrac{q(\pi+h) - q(\pi)}{h} =$ -2

iv. $\lim_{x\to -2^+} q(x) =$ 1

v. $\lim_{x\to 2^+} q(x^2 - 4) =$ 3

vi. $\lim_{x\to -\infty} \left(7q\left(\frac{x}{3}\right) + 1\right) =$ -6

c. [2 points] Given that $q'(5) = 1.5$, find an equation of the line tangent to the graph of $f(x) = q(x) - 4$ at the point $(5, -4)$.

Solution: The equation of the tangent line to the graph of $f(x)$ at the point (5,-4) has a form

$$y - f(5) = f'(5)(x - 5).$$

Now we can plug in $f'(5) = q'(5) = 1.5$ and $f(5) = -4$.

Answer: $y =$ $-4 + 1.5(x - 5)$