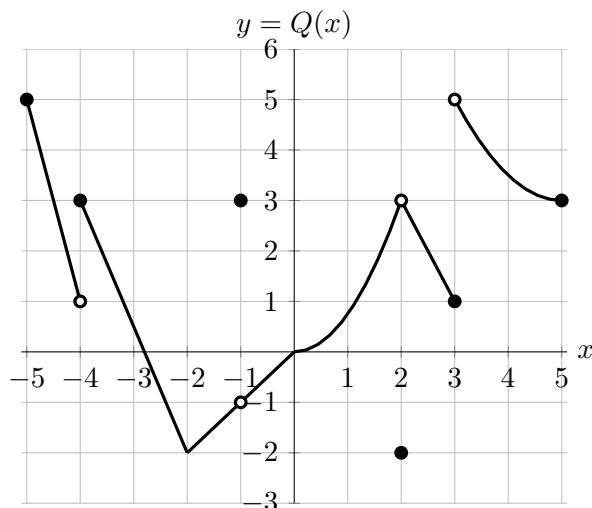


4. [14 points] The graph of a function $Q(x)$ with domain $[-5, 5]$ is shown below.



- a. [2 points] On which of the following intervals is $Q(x)$ invertible? Circle all that are true.

$[-4, -1]$ $[-2, 3]$ $[2, 5]$ $[-2, 2]$ NONE OF THESE.

- b. [8 points] Find the numerical value of the following mathematical expressions. If the answer cannot be determined with the information given, write “NI”. If any of the quantities does not exist, write “DNE”.

i) Find $\lim_{x \rightarrow -1} Q(x)$

Solution:

i) **Answer:** -1.

ii) Find $\lim_{w \rightarrow 2} Q(Q(w))$

Solution:

ii) **Answer:** 1.

iii) Find $\lim_{h \rightarrow 0} \frac{Q(-3+h) - Q(-3)}{h}$

Solution:

iii) **Answer:** -2.5.

iv) Find $\lim_{x \rightarrow \infty} Q\left(\frac{1}{x} + 3\right)$

Solution:

iv) **Answer:** 5.

v) Find $\lim_{x \rightarrow \frac{1}{3}} xQ(3x - 5)$

Solution:

v) **Answer:** DNE.

- c. [2 points] For which values of $-5 < x < 5$ is the function $Q(x)$ not continuous?

Solution: $x = -4, -1, 2, 3.$

- d. [2 points] For which values of $-5 < p < 5$ is $\lim_{x \rightarrow p^-} Q(x) \neq Q(p)$?

Solution: $p = -4, -1, 2.$