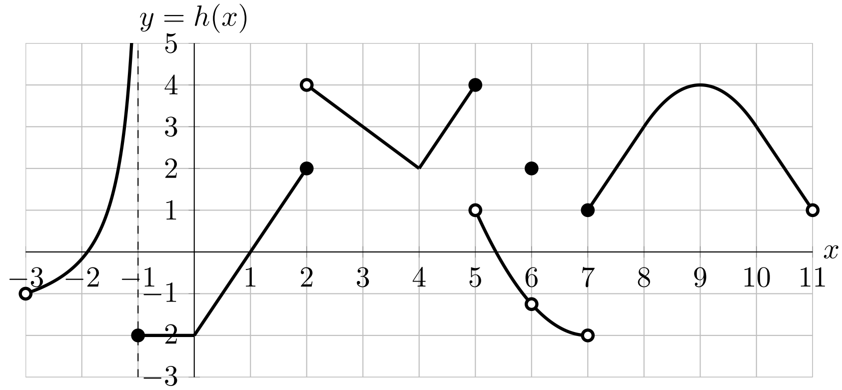
1. [13 points] The graph of a portion of a function $y = h(x)$ is shown below. Note that the graph is linear where it appears to be linear, including on the intervals $[7, 8]$ and $[10, 11)$.



a. [2 points] At which of the following points p is $h(x)$ *not* continuous at $x = p$? Circle *all* such values.

Solution: $\boxed{\text{p=-1}}$ $\quad p = 1 \quad$ $\boxed{\text{p=2}}$ $\quad p = 4 \quad$ $\boxed{\text{p=5}}$ $\quad$ NONE OF THESE

b. [2 points] For which of the following values a is $\lim_{x \to a^+} h(x) = h(a)$? Circle *all* such values.

Solution: $\boxed{\text{a=-1}}$ $\quad a = 2 \quad$ $\boxed{\text{a=4}}$ $\quad a = 5 \quad a = 6 \quad$ NONE OF THESE

For parts **c.**–**e.**, find the exact value of each of the expressions. If the value does not exist, write DNE. If there is not enough information, write NI.

c. [2 points] Calculate the average value of $h(x)$ on the interval $[-1, 1]$.

Solution:

$$\frac{1}{1-(-1)} \int_{-1}^{1} h(x)dx = \frac{1}{2} \int_{-1}^{1} h(x)dx = \frac{1}{2}(-3) = -1.5.$$

Answer= -1.5.

d. [4 points] Suppose $g(x) = h(3h(x))$. Calculate $g'(1.5)$. Show all your computations to receive full credit.

Solution:

$$g'(x) = h'(3h(x))(3h(x))' = 3h'(3h(x))h'(x).$$

Then $g'(1.5) = 3h'(3h(1.5))h'(1.5) = 3h'(3(1))(2) = 6h'(3) = 6(-1) = -6$

Answer= -6.

e. [3 points] Calculate $\displaystyle\int_{7.5}^{10.5} h''(x)\, dx$.

Solution: Using the Fundamental Theorem of Calculus we obtain

$$\int_{7.5}^{10.5} h''(x)\, dx = h'(10.5) - h'(7.5) = (-2) - (2) = -4.$$

Answer= -4.