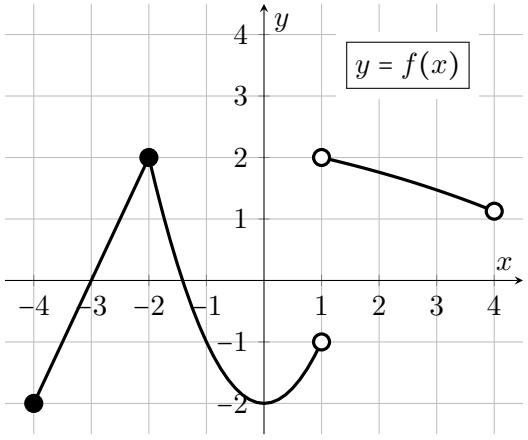
**1**. [11 points] There is information about four different functions below. There is a graph of a function $f(x)$, a piecewise formula for a function $g(x)$, a formula for a function $h(x)$, and a table of some values of an ***invertible*** function $k(x)$.




$$g(x) = \begin{cases} -x & x \le 0 \\ (x-2)^2 & x > 0 \end{cases}$$

$$h(x) = -2(x-1) + 4$$

| $x$ | $-2$ | $0$ | $4$ | $6$ |
|---|---|---|---|---|
| $k(x)$ | $4$ | $1$ | $8$ | $12$ |

**a**. [2 points] Let $m(x) = f(x) + 3$. Find the range of $m(x)$. You can express your answer using either intervals or inequalities.

**Range:**_____

**b**. [2 points] On which of the intervals below is $f(x)$ **decreasing** on the **entire** interval? Circle **all** correct answers.

$(-3,-1)$ $(-2,0)$ $(0,2)$ $(1,3)$ NONE

**c**. [2 points] Let $b(x)$ be the linear function which is perpendicular to $h(x)$ and which goes through the point $(8,3)$. Find a formula for $b(x)$.

$b(x) =$ _____

**d**. [5 points] Find or estimate the value of each of the following; write N/A if a value does not exist or there is not enough information to find it.

(i) If $w(x) = f(x-3)$, $w(1) =$ _____

(ii) $k^{-1}(4) =$ _____

(iii) $k(h(3)) =$ _____

(iv) The average rate of change of $g(x)$ from $x = -2$ to $x = 3$. _____