The graph of a function f is given.
(a) State the value of $f(-1)$.
(b) Estimate the value of $f(2)$.
(c) For what values of x is $f(x) = 2$?
(d) Estimate the values of x such that $f(x) = 0$.
(e) On what interval is f increasing?

Solution:

(a) From the figure we see that the point $(-1, -2)$ lies on the graph of f, so the value of f at -1 is $f(-1) = -2$.

(b) Looking at the figure, we see that the point $(2, f(2))$ is between $(2, 2)$ and $(2, 3)$, and a lot closer to $(2, 3)$ than $(2, 2)$, so I would guess that it is at about $(2, 2.8)$. So the value of f at 2 is approximately $f(2) = 2.8$.

(c) If we look in the figure for where the line $y = 2$ crosses the function, we see that the points of intersection are $(-3, 2)$ and $(1, 2)$. So the values of x that satisfy $f(x) = 2$ are $x = -3$ and $x = 1$.

(d) This time we use the intersection of the line $y = 1$ with the function, and the first point looks like it crosses the line between $(-3, 0)$ and $(-2, 0)$, near the middle, so I'd say the intersection is at $(-2.5, 0)$. This means that one value of x that satisfies $f(x) = 0$ is $x = -2.5$. The second point looks like it crosses the line between $(0, 0)$ and $(1, 0)$, at about $(0.3, 0)$. Thus the second value of x that satisfies $f(x) = 0$ is $x = 0.3$.

(e) We see that $f(x)$ is defined when $-3 \leq x \leq 3$, so the domain of f is the closed interval $[-3, 3]$. Notice that f takes on all values from -2 to 3, so the range of f is $[-2, 3]$.