Problem 1. (4 Points) Use the graph of $f$ in the figure to find the following values.

a $f(1)$

$$f(1) = 2.$$  

b $\lim_{x \to 1} f(x)$

$$\lim_{x \to 1} f(x) = 0.$$  

c $f(0)$

$$f(0) = 2$$  

d $\lim_{x \to 0} f(x)$

$$\lim_{x \to 0} f(x) = 2.$$
Problem 2. (6 points.) When the price for an item is set at $10, consumers are willing to buy 30 items. When the price is set at $100, no consumer is willing to buy the item. Assume that the fixed costs of production on weekly basis are $5000, and the variable costs of item are $60 per item.

(1) Find the linear demand equation, use p for the unit price, and q for the demand. 

The linear function is \( p = m \times q + b \), passing two points (30, 10) and (0,100).

The slope is \( m = \frac{100-10}{0-30} = -\frac{90}{30} = -3 \), because the line \( p = mq + b \) pass the points (0, 100), \( b = 100 \).

\[ p = -3q + 100 \]

(2) What’s the profit function \( P(q) \).

Recall that Profit = Revenue - Cost

Revenue is \( R(q) = pq = q(-3q + 100) \)

Cost is \( C(q) = 5000 + 60q \)

So we have

\[ P(q) = R(q) - C(q) = q(-3q + 100) - 5000 - 60q = -3q^2 + 40q - 5000 \]