

1. 1 points) (a) What is the average of the function x^3 on the interval $1 < x < 3$?

$$\frac{1}{3-1} \int_1^3 x^3 dx = \frac{1}{2} \left(\frac{x^4}{4} \right) \Big|_1^3 = \frac{1}{2} \left(\frac{3^4}{4} - \frac{1}{4} \right) = \left(\frac{80}{4} \right) \frac{1}{2} = 10$$

- (b) If it is known that $\int_1^3 f(x) dx = 4$ and $\int_1^3 (f(x))^2 dx = 5$, then

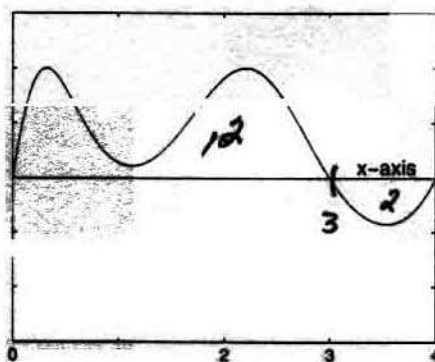
$$\int_1^3 (1 + f(x))^2 dx = \underline{15}$$

$$\int_1^3 1 dx + 2 \int_1^3 f(x) dx + \int_1^3 (f(x))^2 dx$$

$$3 - 1 + 2(4) + 5 = 15$$

- (c) A function $f(x)$ has a graph as shown below, and it is known that $\int_0^4 f(x) dx = 10$, while the area of the region below the x -axis and above the graph of f is 2. Find

$$\int_0^3 f(x) dx = \underline{12}$$



- (d) The average price (in dollars) of a new house that is A square feet in area is a function $P = f(A)$. What are the units of $dP/dA = f'(A)$.

$$\frac{dP}{dA} = \frac{\$}{\text{ft}^2}$$

dollars per sq. foot