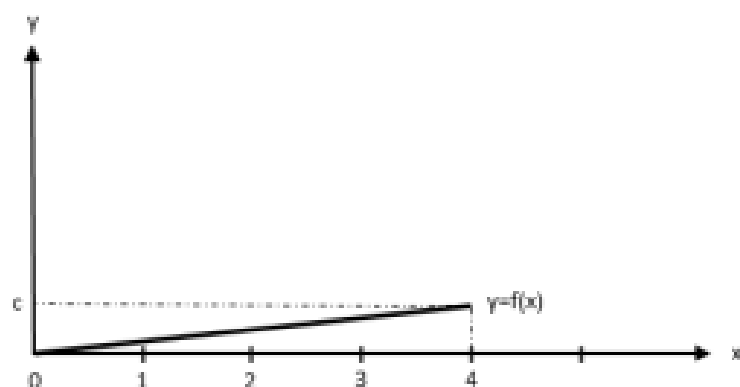**Example.** If X is a continuous random variable with cumulative distribution function

$$F(x) = \begin{cases} 0 & \text{if } x < 0, \\ 0.001x & \text{if } 0 \le x \le 1000, \\ 1 & \text{if } x > 1000, \end{cases}$$

a) find $P\{X \le 400\}$,

b) find $P\{250 < X < 750\}$.

Example. Suppose that a continuous random variable takes values on $[0, 4]$ and the graph of its probability density function is given by

a) Find c.

b) Find $P\{X \le 3\}$.

c) Find $P\{1 \le X \le 2\}$.

1. Check whether the following are suitable probability density functions over the given range:

   (a) $f(x) = \frac{1}{2}(x^2 + 4)$ $0 < x < 1$

   (b) $f(x) = \frac{1}{2}$ $2 < x < 4$

   (c) $f(x) = \frac{x}{4}$ $1 < x < 3$

   (d) $f(x) = \frac{x}{6} + \frac{1}{12}$ $0 < x < 3$

   (e) $f(x) = \frac{1}{2}(2x - 1)$ $0 < x < 2$

2. A variable has a p.d.f. given by

$$f(x) = A\left(x^2 + 4\right) \quad 0 < x < 1.$$

Find the value of the constant A such that this constitutes a valid p.d.f.

*Example

The p.d.f. of the age of babies, x years, being brought to a post-natal clinic is given by

$$f(x) = \begin{cases} \dfrac{3}{4}x(2-x) & 0 < x < 2 \\ \\ 0 & \text{otherwise} \end{cases}$$

If 60 babies are brought in on a particular day, how many are expected to be under 8 months old?