

7.

$$f(x) = [1 + \cos(x + \frac{\pi}{4})][1 + \sin(x + \frac{\pi}{4})], \quad 0 \leq x \leq 2\pi$$

(a) Show that  $f(x)$  may be written in the form

$$f(x) = (\frac{1}{\sqrt{2}} + \cos x)^2, \quad 0 \leq x \leq 2\pi \quad (5)$$

(b) Find the range of the function  $f(x)$ .

(2)

The graph of  $y = f(x)$  is shown in Figure 2.

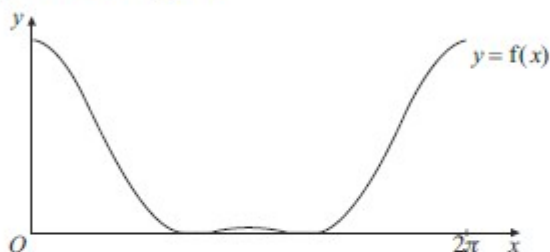


Figure 2

(c) Find the coordinates of all the maximum and minimum points on this curve.

(6)

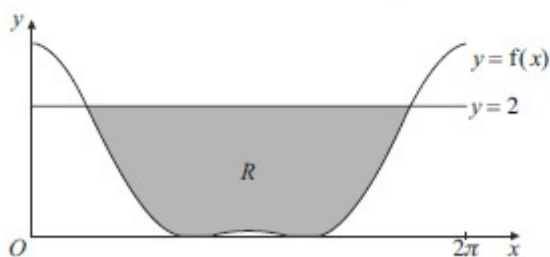


Figure 3

The region  $R$ , bounded by  $y = 2$  and  $y = f(x)$ , is shown shaded in Figure 3.

(d) Find the area of  $R$ .

(8)