

11.

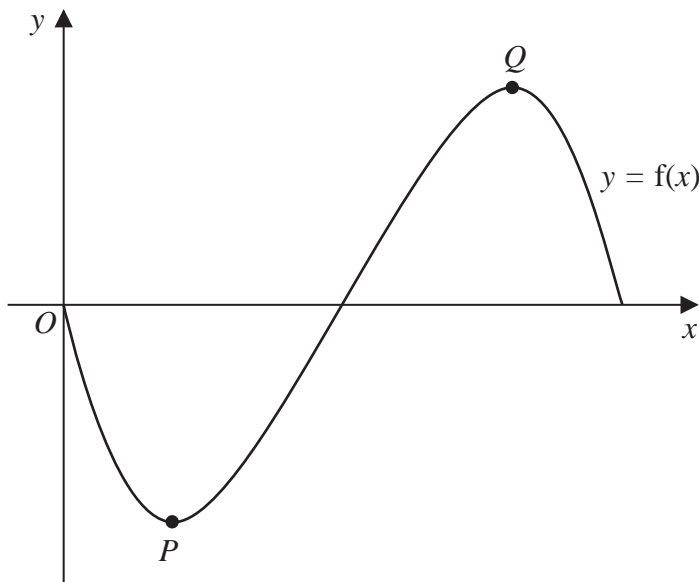


Figure 5

Figure 5 shows a sketch of the curve with equation  $y = f(x)$ , where

$$f(x) = \frac{\sin 2x}{-3 + \cos 2x} \quad 0 \leq x \leq \pi$$

The curve has a minimum turning point at  $P$  and a maximum turning point at  $Q$ , as shown in Figure 5.

(a) Show that the  $x$  coordinate of  $P$  and the  $x$  coordinate of  $Q$  are solutions of the equation

$$\cos 2x = \frac{1}{3} \tag{4}$$

(b) Hence find, to 2 decimal places, the  $x$  coordinate of the maximum turning point on the curve with equation

(i)  $y = f(3x) + 5 \quad 0 \leq x \leq \frac{\pi}{3}$

(ii)  $y = -f\left(\frac{1}{4}x\right) \quad 0 \leq x \leq 4\pi$

(4)