



The diagram shows parts of the curves  $y = (4x + 1)^{\frac{1}{2}}$  and  $y = \frac{1}{2}x^2 + 1$  intersecting at points  $P(0, 1)$  and  $Q(2, 3)$ . The angle between the tangents to the two curves at  $Q$  is  $\alpha$ .

- (i) Find  $\alpha$ , giving your answer in degrees correct to 3 significant figures. [6]
- (ii) Find by integration the area of the shaded region. [6]