7. The curve *C* has Cartesian equation

$$(x^2 + y^2)^2 = 6xy \qquad x > 0, y > 0$$

(a) Show that for $0 < \theta < \dfrac{\pi}{2}$ the equation for *C* can be written as the polar equation
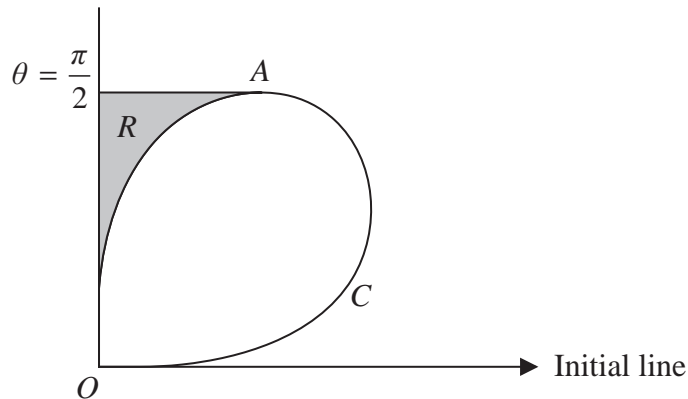
$$r^2 = 3 \sin 2\theta$$

(3)

Figure 1

Figure 1 shows a sketch of the curve *C*. The tangent to *C* at the point *A* is parallel to the initial line.

The finite region *R*, shown shaded in Figure 1, is bounded by *C*, the tangent to the curve at the point *A* and the line with equation $\theta = \dfrac{\pi}{2}$

(b) Use calculus to determine the area of the shaded region *R*.

(9)