**Core 3 Topic Assessment 8 - Differentiation**

**1)** Given that, show that . [3]

**2)** Find  when. [2]

**3)** Differentiate  with respect to *x*. [4]

**4)** (a) A curve has equation . Find  and  [3]

1. The points P and Q are the stationary points of the curve.

(i) Show that the *x*-coordinates of P and Q are given by the solutions of the equation

  [1]

 (ii) By using the substitution , or otherwise, show that the x-coordinates of P and Q are ln2 and ln3. [3]

 (iii) Find the y-coordinates of P and Q, giving each of your answers in the form , where *m* and *n* are integers. [3]

 (iv) Determine the nature of each stationary point. [3]