

5.

$$I = \int \frac{1}{(x-1)\sqrt{(x^2-1)}} dx, \quad x > 1$$

(a) Use the substitution $x = 1 + u^{-1}$ to show that

$$I = -\left(\frac{x+1}{x-1}\right)^{\frac{1}{2}} + c.$$

(7)

(b) Hence show that

$$\int_{\sec \alpha}^{\sec \beta} \frac{1}{(x-1)\sqrt{(x^2-1)}} dx = \cot\left(\frac{\alpha}{2}\right) - \cot\left(\frac{\beta}{2}\right), \quad 0 < \alpha < \beta < \frac{\pi}{2}$$

(5)