

**JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY**

**COMPUTER SCIENCE**

**CALCULUS II CAT ONE**

**TIME: 1hrs**

- a) Show that  $\frac{d}{dx}(\sinh^{-1}x) = \frac{1}{\sqrt{1+x^2}}$ . Hence find  $\frac{dy}{dx}$  given  $y = \sinh^{-1}(\cos x)$  (5mks)
- b) Solve using integration by parts  $\int e^{2x} \sin 3x dx$  (3mks)
- c) Find the equations of the tangents to  $9x^2 + 16y^2 = 52$  that are parallel to the line  $9x - 8y = 1$  (5mks)
- d) Sketch the graph of the function  $f(x) = \frac{x^2 + 2x + 4}{x - 2}$  (5mks)
- e) Given that  $x = \sin^2 t$  and  $y = \ln(\cos t)$ , find  $\frac{d^2y}{dx^2}$  at point  $t = \frac{\pi}{4}$  (5mks)
- f) Solve the integral,  $\int_0^{\frac{\pi}{2}} \sin^5 x \cos^2 x dx$  (5mks)