

## United International University School of Science and Engineering

Final Examination Trimester: Fall 2019 Course Title: Fundamental Calculus (CSE)

Course Code: Math 1151 Marks: 40 Time: 2 hour

## Answer all questions. Answer all the subparts of a question in one place.

1. (a) Evaluate the following integrals by any suitable methods:

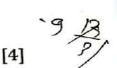
[10]

i) 
$$\int \sin^{-1}(x) dx$$

ii)  $\int e^x \sin x \, dx$ 

iii) 
$$\int \cos^3 x \, dx$$

iv)  $\int x\sqrt{x-1}\,dx$ 



- 2. (a) Show that  $\int_0^{\sqrt{2}} \sqrt{2-x^2} \, dx = \frac{\pi}{2}$  by considering  $x = \sqrt{2} \cos \theta$ .
  - (b) Evaluate: i)  $\int t\sqrt{7t^2+12} \ dt$  ii)  $\int \frac{\sin(\frac{5}{x})}{x^2} dx$  iii)  $\int \frac{1}{\sqrt{1-4x^2}} dx$
- [6]
- 3. (a) Find the area between two curves  $y^2 = 4x$  and y = 2x - 4 by i) integrating with respect to x, ii) integrating with respect to y. [5]
  - **(b)** In each part, evaluate the integral, given that  $f(x) = \begin{cases} -x+1, & x>0 \\ |x+1|, & x\leq 0 \end{cases}$ [5] i)  $\int_{-2}^{2} f(x) dx$  ii)  $\int_{2}^{4} f(x) dx$
- (a) Find  $\frac{dy}{dx}$  of the following functions

i) 
$$y = \sqrt{3 - \sqrt{2x}}$$
 ii)  $y = \sqrt{x} \sec(2x - 2)$  iii)  $y = \sin(\sin(2x))$  [6]

(b) Find the equation of tangent line to the curve  $y = x \cos(x^2 + 2x)$  at [4]  $x=-\frac{\pi}{2}$ .