United International University

School of Science and Engineering

Final Exam Trimester: Fall-17

Course Title: Differential and Integral Calculus

Course Code: Math 151 Marks: 40 Time: 2 hours

There are 5 questions. Answer any 4 of them.

1.	Evaluate the following integrals: (i) $\int (x - 2x^2)e^x dx$	3
	(ii) $\int_1^2 \ln(2t)\, dt$	3
	(iii) $\int \frac{dx}{x^2\sqrt{x^2-25}}$	4
2.	(a) Check whether the following integrals converge or diverge. (i) $\int_{-\infty}^{+\infty} \frac{x}{(x^2+3)^2} dx$ (ii) $\int_1^9 \frac{dz}{\sqrt{9-z}}$	2.5+2.5
	(b) Evaluate $\int_0^4 \int_{-\sqrt{16-x^2}}^{\sqrt{16-x^2}} \int_0^{7-x} x\, dzdydx$	5
3.	(a) Evaluate $\int\int_R x\, dA$, where R is the region in the 4th quadrant enclosed between the circle $x^2 + y^2 = 4$ and the line $y = x - 2$	4
	(b) Evaluate the double integral: $\int_0^1 \int_0^{x^2} (x^3 - 1)y\, dydx$	3
	(c) Evaluate $\int_0^1 (1 - x^2)^{-\frac{1}{2}} dx$	3
4.	(a) $\int\int\int_G xyz\, dV$ where G is the solid that is bounded by the parabolic cylinder $z = 4 - x^x$ and planes $z = 0$, $y = x$ and the $xz -$ plane.	5
	(b) Evaluate $\int \frac{2x^2-1}{(4x-1)(x+1)^2} dx$	5
5.	(a) Evaluate $\int_0^{\frac{\pi}{2}} \sqrt{\tan\theta}\, d\theta$	2.5
	(b) Evaluate $\int \frac{x^3}{(1+x^2)^3} dx$	2.5
	(c) Use a polar double integral to find the area enclosed by three-petaled rose $r = 4\cos 3\theta$ (Sketch the graph)	5