

MATH201 TEST3

Instructions: You must use words and sentences whenever necessary in your answer. Show all your work on the problems. You will be graded on the correctness of your methods as well as the accuracy of your answers.

- 1a) Use polar coordinates to evaluate the integral

$$\iint_R x dA$$

where R is the region in the first quadrant bounded by the circle $x^2 + y^2 = 1$ and the lines $x = 0$ and $y = 0$.

- 1b) A lamina occupies the part of the disk $x^2 + y^2 \leq 1$ in the first quadrant. Find its center of mass if the density at any point is proportional to its distance from the y -axis. [**Hint:** You may make use of the result in question number 1a)]

- 2 Evaluate $\iint_D 2 - x - y dA$, where D is the region bounded by the lines $x + y = 2$, $x = 0$ and $y = 0$.

- 3 Find the volume of the tetrahedron bounded by the planes $z + 2x + 2y = 4$, $x = 0$, $y = 0$ and $z = 0$. [**Hint:** You may make use of the result in question number 2].

- 4 Use the transformation $x = 2u$ and $y = 3v$ to evaluate the integral

$$\iint_R x dA$$

where R is the region bounded by the ellipse $9x^2 + 4y^2 = 36$. [**Hint:** You may make use of the result in question number 1a)]

- 5 [**Bonus**] Evaluate $\int_C x - y ds$, where C is the arc of the parabola $y = x^2$ from $(0, 0)$ to $(2, 4)$.