

الفرقة الأولى  
طابو ٢٠١٤



University	: Menofia	Date	: 27/5/2019
Faculty	: Electronic Engineering	Time	: 90 M.
Department	: Physics & Eng. Maths.	No. of Pages	: 2
Academic Level	: First Year	Full Mark	: 150 Marks
Course Name	: Emg. Math.	Exam	: Terminal
Course Code	: PM4	Examiners	: Prof. R. El-Shanawany

Answer all the following.

1. (18 Marks)

- (a) Evaluate  $\iint_D f(r, \theta) dA$  where  $D$  is the region bounded by the curve  $r = 1$  and the lines  $\theta = \frac{\pi}{6}$  and  $\theta = \frac{\pi}{3}$ .
- (b) The solid  $S$  enclosed by the elliptic paraboloid  $z = 3x^2 + y^2$  and  $z = 4 - x^2 - y^2$  has constant density 1. Express  $M_{xy}$ , its moment w.r.t. the  $xy$ -plane, as an iterated triple integral.
- (c) Use double integration to find the area of the region  $D$  bounded by the curves  $y = x^2$  and  $2y = x^2 + 1$ .

2. (18 Marks)

- (a) Let  $f(x, y) = 3x + 2y$  be defined on the region bounded by the line  $y = x$  and  $y = x^2$ . Evaluate both iterated integrals type 1 and type 2.

- (b) Using simplex method to determine  $x_1$  and  $x_2$  that maximize  $f(x) = 2x_1 + x_2$ , subject to

$$x_1 + 2x_2 - 10 \leq 0$$

$$x_1 + x_2 - 6 \leq 0$$

$$x_1 - x_2 - 2 \leq 0$$

$$x_1 - 2x_2 - 1 \leq 0$$

and

$$x_1, x_2 \geq 0$$

- (c) Use spherical coordinates to find the volume of a sphere of radius  $\gamma$ .

3. (14 Marks)

(a) Evaluate  $\int_0^2 \int_y^2 2ye^{x^3} dx dy$ .

- (b) Using graphical method to maximize  $f(x) = x_1 + x_2$ , subject to  $-2x_1 + x_2 \leq 1$ ,  $x_1 \leq 2$ ,  $x_1 + x_2 \leq 3$  and  $x_1 \geq 0$ ,  $x_2 \geq 0$ .