MA 16020

Instructions. Show all work, with clear logical steps. No work or hard-to-follow work will lose points.

Problem 1. (4 points) Given that the area of D is equal to 2018 and the volume under the surface z = f(x, y) and above the region D is 16020, calculate the average value of the function f(x, y) over the region D.

Solution. Recall that the average value of a function f(x, y) over a region D is given by

$$\frac{1}{\mathcal{A}(D)} \iint_D f(x, y) \, dA,$$

where A(D) is the area of D. Moreover, the volume under the surface z = f(x, y) is precisely $\iint_D f(x, y) dA$. We are given A(D) = 2018 and $\iint_D f(x, y) dA = 16020$, so

$$\frac{1}{\mathcal{A}(D)} \iint_D f(x, y) \, dA = \frac{16020}{2018}.$$

Problem 2. (3 points) What are the three elementary row operations?

Solution.

1. Switch any two rows.

2. Multiply any row by a nonzero number.

3. Add a multiple of one row to another.

Problem 3. (2 points) Put the following matrix into row-echelon form.

$$\begin{bmatrix} 1 & 98129 & 2334 \\ 0 & 1 & 19 \\ 0 & 0 & 3 \end{bmatrix}$$

Solution. Multiply R_3 by $\frac{1}{3}$ to obtain

$$\begin{bmatrix} 1 & 98129 & 2334 \\ 0 & 1 & 19 \\ 0 & 0 & 1 \end{bmatrix} \square$$

Problem 4. (1 point) Are you a fan of the fact that it is 3 weeks into spring but it still feels like winter?

Solution. Absolutely not.