



NATIONAL UNIVERSITY OF TECHNOLOGY, ISLAMABAD  
ASSIGNMENT V (CALCULUS II), SPRING 2019  
DUE DATE: MAY 27, 2019

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- Q.1 Find the extrema of  $f(x, y) = xy$  if  $(x, y)$  is restricted to the ellipse  $4x^2 + y^2 = 4$ .
- Q.2 Find the volume of the largest rectangular box with faces parallel to the coordinate planes that can be inscribed in the ellipsoid  $16x^2 + 4y^2 + 9z^2 = 144$ . (*Hint: Consider the box with lengths  $2x$  (from  $-x$  to  $x$ ), width  $2y$  (from  $-y$  to  $y$ ) and height  $2z$  (from  $-z$  to  $z$ ).*)
- Q.3 Find the point on the plane  $4x + 3y + z = 2$  that is closest to  $(1, -1, 1)$ .
- Q.4 Find a vector in 3-dimensional space whose length is 5 and whose components have the largest possible sum.
- Q.5 Suppose that the temperature at a point  $(x, y)$  on a metal plate is  $T(x, y) = 4x^2 - 4xy + y^2$ . An ant, walking on the plate, traverses a circle of radius 5 centered at the origin. What are the highest and lowest temperatures encountered by the ant?

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**“The two most important days in your life are the day you are born and the day you find out why.” — Mark Twain**