Hacettepe University

MAT 124 MATHEMATICS II
Midterm Examination

Acad.Year : *2019-2020* Semester : *Spring* Date : *22.05.2020* Time : *15:00* Duration : *120 dk*	Name : Surname : Number : Total 100 points

1. (15)	2. (15)	3. (20)	4. (20)	5. (15)	6. (15)		

1. Identify the conic section with the given equation

$$4x^2 - 9y^2 - 16x + 54y - 101 = 0$$

and find its focus or foci.

2. Determine if the plane given by $-x+2z = 10$ and the line given by $\overrightarrow{r(t)} = 5i+(2-t)j+(10+4t)k$ are orthogonal, parallel or neither.

3. Determine whether the following limits exist and calculate if it exists:

(a) $\lim_{(x,y)\to(0,0)} \frac{xy}{\sqrt{x^2+y^2}}$ (b) $\lim_{(x,y)\to(0,0)} \frac{xy}{x^3+y^3}$

4. (a) Use the Chain Rule to find $\frac{\partial w}{\partial u}$ and $\frac{\partial w}{\partial v}$ when $u = 3$, $v = -1$ if $w = xe^{y-z^2}$, where $x = 2uv$, $y = u - v$, $z = u + v$.

(b) If $f(x, y) = ye^{-x}$, find the rate of change of f at the point $P(0, 1)$ in the direction from P to $Q(1, \frac{1}{2})$. In what direction does f increase most rapidly at $P(0, 1)$?

5. Find the tangent line to the curve that is the intersection of the surfaces $xy + yz + zx - 3 = 0$ and $\sin(xyz) = x - 3y + 2z$ at the point (3,1,0).

6. Find the points on the surface $xy^2z^4 = \frac{1}{4}$ that are closest to the origin.