

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

DEPARTMENT OF MATHEMATICS & STATISTICS

MATH201 - Section 16 (Term 171)

Date: November 16, 2017

Test 3

Duration: 50 minutes

Family Name: _____ **ID #:** 201_____0 **Serial #:** ____

1. Find the equation of the plane that passes through the points $P(5, 2, 0)$, $Q(1, 3, 2)$ and $R(3, -1, -6)$. **(8 points)**

2. Find the symmetric equations of the line that passes through the points $P(0, 3, -2)$ and $Q(1, 2, -1)$ **(4 points)**

3. Identify and sketch the quadratic surface

$$x^2 - 4z + y + z^2 - 2x + 5 = 0$$

(8 points)

4. Let

$$f(x, y) = \sqrt{4x^2 + y^2 - 9}$$

(a) Find and sketch the domain of $f(x, y)$.

(b) Find the range of $f(x, y)$.

(c) Sketch the level curve for $k = f(2, 3)$.

(6 + 3 + 5 = 14 points)

5. Evaluate the following limit or show that it does not exist.

$$\lim_{(x,y) \rightarrow (0,0)} \frac{xy^3}{x^2 + y^6}$$

(8 points)

6. Where are the following functions continuous?

(a) $f(x, y) = \frac{10x+y}{\ln(x^2+y^2+1)}$

(b) $f(x, y) = \begin{cases} \frac{xy^3}{x^2+y^6} & (x, y) \neq (0,0) \\ 1 & (x, y) = (0,0) \end{cases}$

(4 + 4 = 8 points)

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DEPARTMENT OF MATHEMATICS & STATISTICS

MATH201 - Section 19 (Term 171)

Date: November 16, 2017

Test 3

Duration: 50 minutes

Family Name: _____ ID #: 201_____0 Serial #: ____

1. Find the equation of the plane that passes through the point $P(-1, -4, 5)$ and containing the line with parametric equations

$$x = 1 - t, \quad y = 2t - 3, \quad z = t$$

[Hint: Find another two points on the plane]

(8 points)

2. Find the point of intersection of the line

$$x = 2 + 3t, \quad y = 1 + 2t, \quad z = -1 - t$$

with the plane $2x - 3y + 4z = 13$.

(4 points)

3. Identify and sketch the quadratic surface

$$x^2 - 4z - y^2 + z^2 - 2x + 6 = 0$$

(8 points)

4. Let

$$f(x, y) = \frac{1}{\sqrt{\ln(x^2 + y^2)}}$$

(a) Find and sketch the domain of $f(x, y)$.

(b) Find the range of $f(x, y)$.

(c) Sketch the level curve for $k = f(0, e)$.

(6 + 3 + 5 = 14 points)

5. For the following limits, evaluate the limit or show that it does not exist.

(a) $\lim_{(x,y) \rightarrow (0,0)} \frac{3x^2y}{x^4+y^2}$

(b) $\lim_{(x,y) \rightarrow (0,0)} \frac{x+y}{3-\sqrt{x+y+9}}$

(8 + 8 = 16 points)

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

DEPARTMENT OF MATHEMATICS & STATISTICS

MATH201 - Section 21 (Term 171)

Date: November 16, 2017

Test 3

Duration: 50 minutes

Family Name: _____ **ID #:** 201_____**0** **Serial #:** ____

1. Find the equation of the plane that passes through the points $P(0, 3, -2)$, $Q(1, 2, -1)$ and $R(-1, 0, 3)$. **(8 points)**

2. Find the symmetric equations of the line that passes through the points $P(5, 2, 0)$ and $Q(1, 3, 2)$. **(4 points)**

3. Identify and sketch the quadratic surface

$$x^2 - 4z - y^2 + z^2 - 2x + 4 = 0$$

(8 points)

4. Let

$$f(x, y) = \ln[4x^2 + y^2 - 16]$$

(a) Find and sketch the domain of $f(x, y)$.

(b) Find the range of $f(x, y)$.

(c) Sketch the level curve for $k = f(2, 1)$.

(6 + 3 + 5 = 14 points)

5. Evaluate the following limit or show that it does not exist.

$$\lim_{(x,y) \rightarrow (0,0)} \frac{xy^3}{x^2 + y^6}$$

(8 points)

6. Where are the following functions continuous?

(a) $f(x, y) = \frac{7}{\sqrt{x^2 - y + 1}}$

(b) $f(x, y) = \begin{cases} \frac{xy^3}{x^2 + y^6} & (x, y) \neq (0, 0) \\ 1 & (x, y) = (0, 0) \end{cases}$

(4 + 4 = 8 points)