M E T U
Northern Cyprus Campus

	Calculus for Functions of Several Variables Short Exam 1	
Code : *Math 120* Acad.Year: *2013-2014* Semester : *Spring* Date : *19.03.2014* Time : *18:40* Duration : *40 minutes*	Last Name: Name: Student No: Signature:	
	4 QUESTIONS ON 2 PAGES TOTAL 20+2=22 POINTS	

1(4)	2(6)	3(8)	4(4)			

Show your work! No calculators! Please draw a box around your answers!
Please do not write on your desk!

1. (4 pts.) Find the **point** where the line $\langle t+1, -t+1, 3t+4\rangle$ intersects the plane $3x + 6y - 2z = -8$.

$x = t+1$, $y = -t+1$, $z = 3t+4$

$3(t+1) + 6(-t+1) - 2(3t+4) = -8$

$3t+3 - 6t + 6 - 6t - 8 = -8$

$-9t = -9$

$\boxed{t = 1} \Rightarrow$ $r(1)$ is on the plane

$r(1) = \langle 2, 0, 7\rangle$

$L \cap \Pi = \{(2,0,7)\}$

2. ($3 \times 2 = 6$ pts.) **Identify** the following surfaces as an *elliptical paraboloid, hyperbolic paraboloid, a hyperboloid of one sheet, a hyperboloid of two sheets, a cone, a circular cylinder, an elliptical cylinder, or a parabolic cylinder.*
Identify the axis of symmetry as the x-axis, the y-axis, or the z-axis.

(a) $3x^2 + y^2 - z^2 + 1 = 0$

hyperboloid of 2 sheets ; z-axis

(b) $x^2 + 5y - 3z^2 + 1 = 0$

hyperbolic paraboloid ; y-axis

(c) $x + 2y^2 - 3z^2 = 0$

hyperbolic paraboloid ; x-axis

3. ($8 \times 1 = 8$ pts.) Determine whether the following statements in Cartesian 3−space are **always** true or false. Indicate your answers with the words **TRUE** or **FALSE** to the left of the question. No explanations required.

- Two lines either intersect or are parallel.

  FALSE

- Two lines determine a unique plane.

  FALSE

- Two lines perpendicular to a third line are parallel.

  FALSE

- Two lines parallel to a third line are parallel.

  TRUE

- Two lines parallel to a plane are parallel.

  FALSE

- Two planes either intersect or are parallel.

  TRUE

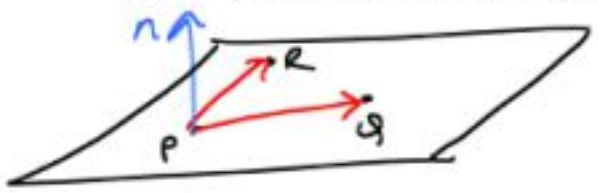
- Two planes perpendicular to a line are parallel.

  TRUE

- Two planes parallel to a line are parallel.

  FALSE

4. (4 pts.) Find an equation of the plane that passes through the points $P = (1, 2, 3)$, $Q = (2, 3, 4)$, and $R = (3, 3, 3)$.



$$\vec{n} = \vec{PQ} \times \vec{PR} = \langle 1,1,1 \rangle \times \langle 2,1,0 \rangle$$

$$= \begin{vmatrix} i & j & k \\ 1 & 1 & 1 \\ 2 & 1 & 0 \end{vmatrix} = \langle -1, +2, -1 \rangle$$

$$= \langle -1, 2, -1 \rangle$$

instead take $\langle 1, -2, 1 \rangle$

Π : $x - 2y + z = 1 - 2 \cdot 2 + 3 = 1 - 4 + 3 = 0$

$$\boxed{x - 2y + z = 0}$$