LAST NAME:	FIRST NAME:	CIRCLE:		
		Zweck 10:00am	Khafizov 11:30am	Khafizov 2:30pm

1 /9	2 /15	3 /15	4 /12	5 /12	6 /12	T /75

MATH 2415 (Spring 2016) Exam I, Feb 19th

No books or notes! You may use a scientific calculator provided it does not allow for access to the internet. Show all work and give **complete explanations**. Don't spend too much time on any one problem. This 90 minute exam is worth 75 points.

(1) [9 pts] Find a parametrization of the line that goes through the point $(2, 1, 3)$ and that is perpendicular to the plane $z = 3x + 2y + 4$. Write your final answer in the box, and explain the reasons for your answer in the space below.

Final Answer:

(2) [15 pts]

(a) Calculate the angle between the vectors $\mathbf{u} = (1, 0, 0)$ and $\mathbf{v} = (\sqrt{6}, 1, 1)$. Write your final answer in the box, and explain the reasons for your answer in the space below.

Final Answer:

(b) Find the area of the parallelogram with vertices $(2, 2, 3)$, $(7, 3, 8)$, $(3, 4, 6)$, and $(6, 1, 5)$. Write your final answer in the box, and explain the reasons for your answer in the space below.

Final Answer:

(3) [15 pts]
(a) Let P be the point with spherical coordinates $(\rho, \theta, \phi) = (2, \frac{\pi}{4}, \frac{\pi}{6})$. Find the cylindrical coordinates of P. Write your final answer in the box, and explain the reasons for your answer in the space below.

Final Answer:

(b) Sketch the surfaces whose equations in cylindrical coordinates are given by:

(i) $z = 2r$

(ii) $\theta = \frac{\pi}{4}$.

(4) [12 pts] Find the equation of the plane that goes through the point $(-1, 2, 5)$ and that contains the line $x = 1 + 2t$, $y = -3 + 5t$, $z = 4t$. In the box, write your final answer in the form $Ax + By + Cz = D$. Explain the reasons for your answer in the space below.

Final Answer:

(5) [12 pts] Make a labelled sketch of the traces (slices) of the surface

$$2x^2 - y^2 - 4z^2 = 8$$

in the planes $y = 0$, $z = 0$, and $x = k$ for $k = 0$, ± 1, ± 2, ± 3. Then sketch the surface.

(6) [12 pts]
Let C be the curve with parametrization $(x, y, z) = \mathbf{r}(t) = (4t, 2\sin t, \cos t)$.

(a) Calculate the tangent vector to C when $t = \frac{\pi}{4}$. Write your final answer in the box, and explain the reasons for your answer in the space below.

Final Answer:

(b) Show that the curve C lies on an elliptical cylinder.

Please sign the following honor statement:

On my honor, I pledge that I have neither given nor received any aid on this exam.

Signature: _____