Math 261 Sample Exam 1

Show all work!	Name:	Score	

1. The points $P(2,3,-4)$ and $Q(8,3,4)$ are endpoints of the diameter of a sphere. Find:

   a) The radius of the sphere. b) The equation of the sphere.

   Ans:_____. Ans:_____.

1	
2	
3	
4	
5	
6	

2. Given the force $\mathbf{F}=\langle 2,1,-3\rangle$ and the displacement $\mathbf{r}=\langle 4,-1,1\rangle$, Find:

   a) The component of $\mathbf{F}$ along $\mathbf{r}$. b) The work done by the force.

   Ans:_____. Ans:_____.

7	
8	
9	
10	
Tot	

3. Find the equation of the plane through the point $P(1,-2,4)$ and:

   a) parallel to $3x-2y+z=8$. b) Perpendicular to the line $x+2=2y-6=z/5$.

   Ans:_____. Ans:_____.

4. Given the vectors $\mathbf{a}=2\mathbf{i}-4\mathbf{j}+2\mathbf{k}$, $\mathbf{b}=3\mathbf{i}+2\mathbf{k}$, and $\mathbf{c}=3\mathbf{j}-\mathbf{k}$, find:

   a) A normal to $\mathbf{a}$ and $\mathbf{b}$. b) The volume of the parallepiped spanned by $\mathbf{a}$, $\mathbf{b}$ and $\mathbf{c}$.

   Ans:_____. Ans:_____.

5. Let $\mathcal{L}$ be the line of intersection of the planes $\mathcal{P}_1:\ 2x+y-z=3$ and $\mathcal{P}_2:\ x-2y+z=-1$. Find:

   a) The point in $\mathcal{L}$ with $x=0$. b) A parametric equation of $\mathcal{L}$.

   Ans:_____. Ans:_____.

Extra Space

Part II.	Name:

6. Identify the names of the graphs described by the following equations in $\mathbb{R}^3$.

a) $4x^2 = 4y^2 + z^2$ Ans:_____ .

b) $x^2 - 6y^2 - z^2 = 9$ Ans:_____ .

c) $2x^2 + 4y^2 - 6z = 0$ Ans:_____ .

d) $9y = z^2 - 4x^2$ Ans:_____ .

e) $\mathbf{r}(t) = \langle 7, 3\cosh t, 4\sinh t, \rangle$ Ans:_____ .

f) $\mathbf{r}(t) = \langle 8t, 4t^2 - 1, -2 \rangle$ Ans:_____ .

7. Describe and sketch the following surfaces in $\mathbf{R}^3$ (label the coordinate axes):

a) $y = 4x^2 - 9z^2$.

b) $x + y = 4$

8. Let $\mathbf{r}(t) = \langle 2t, t^2, \frac{1}{3}t^3 \rangle$, with $0 \le t \le 1$.

a) Find the length of the curve.

Ans:_____ .

9. Let $\mathbf{r}(t) = (2 + t)\mathbf{i} + (4 - t^2)\mathbf{j} + (1/3)t^3\mathbf{k}$.

a) Find the speed at $t = 1$.

Ans:_____ .

b) Find the unit tangent $\mathbf{T}$ at $t = 1$.

Ans:_____ .

10. c) the curvature κ at $t = 1$.

Ans:_____ .

d) Find the centripetal acceleration a_N at $t = 1$.

Ans:_____ .

Extra Space