

Math 261 Exam 1, Fall 2005

Show all work!		Name:	Score	
1.	Given the two points $P(4,3,-1)$ and $Q(-2,1,3)$ , find the equation of: a) The line through $P$ and $Q$ .  Ans:_____	b) The sphere through $Q$ centered at $P$ .  Ans:_____	1	
			2	
			3	
			4	
			5	
			6	
2.	Given the force $\mathbf{F}=\langle 4, -1, 4 \rangle$ and the displacement $\mathbf{r}=\langle 2, -2, 4 \rangle$ , find: a) The component of $\mathbf{F}$ in the direction of $\mathbf{r}$ .  Ans:_____	b) The work done by the force.  Ans:_____	7	
			8	
			9	
			10	
			Tot	
3.	Find the equation of the plane through the point $P(-1, 3, 2)$ and: a) Parallel to $2x - y + 6z = -4$ .  Ans:_____	b) Perpendicular to $\mathbf{r}(t)=\langle 2t, 8 - 2t, 4 + t \rangle$ .  Ans:_____		
4.	Given the points $O(0, 0, 0)$ , $P(3, 0, 0)$ , $Q(0, 6, 0)$ , and $R(0, 0, 9)$ and Find: a) The area of $\triangle PQR$ .  Ans:_____	b) The volume of the tetrahedron $OPQR$ .  Ans:_____		
5.	A plane $\mathcal{P}$ contains the point $Q(3, 2, 1)$ and the line $\mathbf{r}(t) = \langle 2 + 3t, -2t, 1 - t \rangle$ . Find: a) A normal $\mathbf{N}$ to the plane $\mathcal{P}$ .  Ans:_____	b) The equation of the plane.  Ans:_____		
Extra Space				

Part II.	Name:
<p>6. Identify the names of the graphs described by the following equations in <math>\mathbb{R}^3</math>.</p> <p>a) <math>9x^2 + 16y^2 = 25z^2</math>      Ans:_____.</p> <p>c) <math>9x + 12y^2 - z^2 = 0</math>      Ans:_____.</p> <p>e) <math>\mathbf{r}(t) = \langle \cos 2t, 4 \sin 2t, 5t \rangle</math>      Ans:_____.</p>	<p>b) <math>4x^2 - y^2 - 9z^2 = -1</math>      Ans:_____.</p> <p>d) <math>y^2 + z^2 = 16x</math>      Ans:_____.</p> <p>f) <math>\mathbf{r}(t) = \langle 8, \cosh t, \sinh t \rangle</math>      Ans:_____.</p>
<p>7. Given the vector function <math>\mathbf{r}(t) = \langle 2 \sin 3t, 4t, 3 \cos 3t \rangle</math>, find</p> <p>a) The velocity vector at <math>t = \pi/6</math>.</p> <p style="text-align: right;">Ans:_____.</p>	<p>b) The magnitude of the acceleration.</p> <p style="text-align: right;">Ans:_____.</p>
<p>8. Given the vector function: <math>\mathbf{r}(t) = (2 + 5t) \mathbf{i} + (1 - t) \mathbf{j} + 7t \mathbf{k}</math>, with <math>0 \leq t \leq 1</math>.</p> <p>a) Find the arclength.</p> <p style="text-align: right;">Ans:_____.</p>	<p>b) Reparametrize with respect to arclength.</p> <p style="text-align: right;">Ans:_____.</p>
<p>9. Let <math>\mathbf{r}(t) = \langle e^t, \sqrt{2}t, e^{-t} \rangle</math>.</p> <p>a) Find the speed.</p> <p style="text-align: right;">Ans:_____.</p> <p>10. c) The tangential acceleration.</p> <p style="text-align: right;">Ans:_____.</p>	<p>b) Find <math>\mathbf{T}</math>.</p> <p style="text-align: right;">Ans:_____.</p> <p>d) Find the centripetal acceleration <math>a_N</math>.</p> <p style="text-align: right;">Ans:_____.</p>
<p>Extra Space</p>	