

Math 261 Exam 1, Spring 2021

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. Ans:_____	b) The equation of the sphere. 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} . Ans:_____	b) The work done by the force. Ans:_____	7	
			8	
			9	
			10	
			Tot	
3.	Find the equation of the plane through the point $P(1, -2, 4)$ and: a) parallel to $3x - 2y + z = 8$. Ans:_____	b) Perpendicular to the line $x + 2 = 2y - 6 = z/5$. 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} . Ans:_____	b) The volume of the parallelepiped spanned by \mathbf{a} , \mathbf{b} and \mathbf{c} . 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 $x = 0$. Ans:_____	b) A parametric equation of \mathcal{L} . Ans:_____		
Extra Space				

Part II.	Name:
<p>6. Identify the names of the graphs described by the following equations in \mathbf{R}^3.</p> <p>a) $4x^2 = 4y^2 + z^2$ Ans:_____.</p> <p>c) $2x^2 + 4y^2 - 6z = 0$ Ans:_____.</p> <p>e) $\mathbf{r}(t) = \langle 7, 3 \cosh t, 4 \sinh t, \rangle$ Ans:_____.</p>	<p>b) $x^2 - 6y^2 - z^2 = 9$ Ans:_____.</p> <p>d) $9y = z^2 - 4x^2$ Ans:_____.</p> <p>f) $\mathbf{r}(t) = \langle 8t, 4t^2 - 1, -2 \rangle$ Ans:_____.</p>
<p>7. Describe and sketch the following surfaces in \mathbf{R}^3 (label the coordinate axes):</p> <p>a) $y = 4x^2 - 9z^2$.</p>	<p>b) $x + y = 4$</p>
<p>8. Let $\mathbf{r}(t) = \langle 2t, t^2, \frac{1}{3}t^3 \rangle$, with $0 \leq t \leq 1$.</p> <p>a) Find the length of the curve.</p>	<p>Ans:_____.</p>
<p>9. Let $\mathbf{r}(t) = (2 + t)\mathbf{i} + (4 - t^2)\mathbf{j} + (1/3)t^3\mathbf{k}$.</p> <p>a) Find the speed at $t = 1$.</p>	<p>b) Find the unit tangent \mathbf{T} at $t = 1$.</p>
<p>10. c) the curvature κ at $t = 1$.</p>	<p>d) Find the centripetal acceleration a_N at $t = 1$.</p>
<p>Ans:_____.</p> <p>Ans:_____.</p>	<p>Ans:_____.</p> <p>Ans:_____.</p>
<p>Extra Space</p>	