

Directions: Do not simplify unless indicated. No calculators are permitted. Show all work as appropriate for the methods taught in this course. Partial credit will be given for any work, words or ideas which are relevant to the problem.

Please put problem 1 on answer sheet 1

1. (a) Find all values of t so that $\bar{a} = t\hat{i} - 2\hat{j} + 1\hat{k}$ is perpendicular to $\bar{b} = t\hat{i} + 2t\hat{j} - 5\hat{k}$. [8 pts]
 (b) Find the distance between the origin and the plane $2x + y - 3z = 2$. [12 pts]
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Please put problem 2 on answer sheet 2

2. (a) Find the equation in the form $ax + by + cz = d$ (some of a, b, c might be zero) of the plane containing the point $(1, 2, 3)$ and perpendicular to the line with symmetric equation [8 pts]

$$\frac{x}{3} = \frac{1-z}{2}, y = 3$$

- (b) Find the normal component of acceleration a_N at $t = 2$ for the curve parametrized by $\bar{r}(t) = t\hat{i} - t^2\hat{j} + t^2\hat{k}$. [12 pts]
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Please put problem 3 on answer sheet 3

3. (a) Sketch the vector valued function $\bar{r}(t) = 2\cos t\hat{i} - 2\hat{j} + 5\sin t\hat{k}$ for $0 \leq t \leq \pi$. Label three points with their coordinates. [10 pts]
 (b) Write down the parametrizations of the quarter circle $x^2 + y^2 = 9$ in the first quadrant along with the line segment joining the endpoints, in a counterclockwise direction. [10 pts]
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Please put problem 4 on answer sheet 4

4. (a) Sketch the plane $2y + 4z = 8$ and label two points with their coordinates. [8 pts]
 (b) Find the length of the curve parametrized by $\bar{r}(t) = 3e^{2t}\hat{i} + 4e^{2t}\hat{j}$ with $0 \leq t \leq 2$. [12 pts]
 Note: If you're careful the integral should be easy.
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Please put problem 5 on answer sheet 5

5. (a) Find the single point where the plane $x + 2y - z = 2$ meets the line with symmetric equation [10 pts]

$$\frac{x-1}{2} = \frac{y}{3} = z$$

- (b) Explain why the following vector valued function is piecewise smooth but not smooth: [10 pts]

$$\bar{r}(t) = (t^2 - 4t)\hat{i} + 3\hat{j} + (t^3 - 12t)\hat{k} \quad \text{for} \quad 0 \leq t \leq 4$$

The End and the TA Section List

Liam	0111 = 8:00	0121 = 9:30
Patrick	0112 = 8:00	0122 = 9:30
Phil	0131 = 12:30	0141 = 2:00
Jon	0132 = 12:30	0142 = 2:00