Math 225: Calculus III Name:______________________________

Exam I *September 27, 1990* Score:______________________________

Record your answers to the multiple choice problems by placing an $\times$ through one letter for each problem on this answer sheet. There are 17 multiple choice questions worth 6 points each for a total of 102 points.

The distance between the points $(1, -2, 5)$ and $(-1, 6, 3)$ is best approximated by 8.49 4.45 6.23 2.57 10.14

Which two vectors are perpendicular? $3 \subset - \supset -2$ and $- \subset + \supset -2$ $- \subset +2 \supset +$ and $\subset -2 \supset +$ $\subset - \supset$ and $\supset - \subset$ and $\subset + \supset +$ $\subset + \supset +2$ and $3 \subset +3 \supset -6$

Find the angle between the vectors $= \subset + \supset +$ and $=(\sqrt{2}+3) \subset +\sqrt{2} \supset +(\sqrt{2}-3)$. $\pi/3$ $\pi/6$ 0 $\pi/2$ $3\pi/4$

Find the projection of the vector $= \subset +2 \supset$ on the vector $=- \subset + \supset +$. $\frac{1}{3}(- \subset + \supset +)$ $\frac{1}{\sqrt{15}}(- \subset + \supset +)$ $\frac{1}{\sqrt{5}}(\subset +2 \supset)$ $- \subset + \supset +$ $\mathbf{0}$

Compute the triple product $\times(\times)$ of the vectors $= \subset + \supset$, $= \supset +$, and $= \subset +$. $\supset - \subset$ $- \subset - \supset$ $\subset - \supset +$

Which of the following vectors is normal to the plane containing the points $P_1 = (5, 0, 1)$, $P_2 = (1, 1, 0)$, and $P_3(-1, 0, 0)$? $\subset -2 \supset -6$ $\subset -4 \supset +3$ $- \subset - \supset +5$ $\subset - \supset +5$ $\subset +2 \supset -2$

Find the distance from the point $(0, 1, 0)$ to the line $x = 1$, $\frac{y}{4} = \frac{(z-2)}{3}$. $\frac{\sqrt{146}}{5}$ $\frac{\sqrt{159}}{5}$ $\frac{\sqrt{212}}{4}$ $\frac{\sqrt{116}}{3}$ $\frac{\sqrt{189}}{4}$

Find the distance from the point $(1, 2, -3)$ to the plane $7x + 3y + z = 5$. $\frac{5}{\sqrt{59}}$ $\frac{10}{\sqrt{59}}$ $\frac{3}{\sqrt{13}}$ $\frac{25}{\sqrt{767}}$ $\frac{5}{\sqrt{13}}$

Find the point where the plane $2x - 3y - z = 6$ and the line $(t) = (1+t) \subset +t \supset +(1-t)$ intersect. *no such point* $(1, -1, -1)$ $(1, 0, 1)$ $(2, 1, 0)$ $(0, 0, -6)$

Determine the symmetric equations of the line tangent to the curve $(t) = \cos(t) \subset + \sin(t) \supset + \sin(2t)$ at the point $(1, 0, 0)$. $x = 1, \quad y = \frac{z}{2}$ $x - 1 = y = \frac{z}{2}$ x-axis $x = 1, \quad y = 0$ $y = 0, \quad x - 1 = \frac{z}{2}$

Which of the following statements applies to the curve defined by $(t) = t^2 \subset +t^3 \supset +t^5$. *piecewise smooth, but not smooth* *smooth* *continuous, but not piecewise smooth* *not continuous* *none of the above apply*

The position of a particle at time $t \geq 0$ is given by $(t) = (t^3 - t) \subset +t^2 \supset +(t^5 - t^3)$. Compute the *speed* of the particle at time $t = 1$. $2\sqrt{3}$ $2 \subset +2 \supset +2$ $\sqrt{25t^8 - 30t^6 + 18t^4 - 2t^2}$ $3 \subset +2 \supset$ $\sqrt{11}$

The tangential component of acceleration of an object with position $(t) = e^t \subset +e^{-t} \supset +\sqrt{2}\,t$ is $a_T = e^t - e^{-t}$. Determine the normal component of acceleration, a_N. $\sqrt{2}$ $\sqrt{e^{2t} + e^{-2t}}$ $e^t + e^{-t}$ $e^t \subset +e^{-t} \supset$ $e^t \subset -e^{-t} \supset +\sqrt{2}$

Suppose $(0) = \subset + \supset +2$, $'(0) = \supset -$, $(0) = -5 \subset -2 \supset +3$, and $'(0) = \subset +4 \supset$. Compute $(\bullet)'(0)$. 0 -5 5 -4 1

Let $(t) = t\sin(t) \subset +t\cos(t) \supset +te^t$. Find $'(0)$. $\supset +$ $(\sin(t) + t\cos(t)) \subset +(\cos(t) - t\sin(t)) \supset +e^t$ $\subset +$ $\cos(t) + t$ 2

Determine a vector valued function (t) such that $'(t) = \subset +2e^{-t} \supset +\frac{1}{1+t}$ and $(0) = \subset$. $(t) = (t+1) \subset +2(1 - e^{-t}) \supset + \ln(1+t)$ $(t) = (1-t) \subset +(1 - e^{-t}) \supset + \ln(1+t)$ $(t) = t \subset +(2 - e^{-t}) \supset -(1 + \ln(1+t))$ $(t) = t \subset -2e^{-t} \supset + \ln(1+t)$ $(t) = (t^2 + 1) \subset +(1 - e^{-2t}) \supset - \ln(1+t)$

Which of the following is the length of the curve parameterized by $(t) = (1+t) \subset +(2-t^2) \supset +(3+t^3)$, $0 \leq t \leq 1$.
$\int_0^1 \sqrt{1 + 4t^2 + 9t^4}\,dt$ $\frac{52}{15}$ $\frac{7}{3}$ $\sqrt{14}$ $\int_0^1 \sqrt{14 + 2t - 7t^2 + 4t^4 + 18t^3 + 9t^6}\,dt$