Math 225: Calculus III Name:____________________________

Exam I *February 11, 1997* Section:____________________________

Record your answers to the multiple choice problems by placing an $\times$ through one letter for each problem on this answer sheet. There are 15 multiple choice questions worth 5 points each. You start with 25 points.

Find the distance from the point $(2,1,-1)$ to the z-axis. $\sqrt{5}$ 1 $\sqrt{3}$ $\sqrt{2}$ 2

Find the area of the parallelogram with vertices at the points $(0,0,0)$, $(-3,1,2)$, $(1,1,4)$, and $(-2,2,6)$. 14.697 13.250 12.765 15.913 11.832

Which of the following vectors is perpendicular to $\check{=} \subset -3 \supset +5$. $\subset +2 \supset + 4 \subset + \supset$ $5 \subset + - \subset + \supset + 2 \subset +3 \supset -$

Find the angle in radians between the vectors $\check{=} \subset -2 \supset +$ and $= \subset - \supset$. $\pi/6$ $\pi/3$ $\pi/4$ π $4\pi/3$

Let $= - \subset + \supset +3$ and $= 4 \subset +$. Compute $\times$ ı+ 13ȷ- 4-7-12ı+ ȷ- 4-4ı- 33ı+ 5ȷ+ 2

Find the point where the line $x=-5+2t$, $y=6-t$, $z=2+5t$ intersects the plane $x-y+2z=6$. $(-3,5,7)$ $(-1,4,12)$ $(-7,7,-3)$ $(7,0,32)$ $(0,0,2)$

Find the equation of the plane perpendicular to the line $x=1+4t$, $y=1-t$, $z=-3$ passing through the point $(1,1,1)$. $4x-y=3$ $x+y+z=-1$ $4x-y-3z=0$ $x+y=2$ $x-2y+z=0$

Calculate the distance from the origin to the plane $x+y-z=1$. 0.577 1.0 0.684 0.967 1.121

Find a vector perpendicular to the plane $5x-3y+z=2$. $5 \subset -3 \supset + 3 \subset -5 \supset$ $\subset +2 \supset - \subset - \supset -2$ $2 \subset +3 \supset -5$

Find the equation of the line tangent to the curve $(t) = (t^3+1) \subset -(t-1)^2 \supset +e^{3t-3}$ at the point $(2,0,1)$. $x=2+3t$, $y=0$, $z=1+3t$ $x=3t$, $y=0$, $z=3t$ $x=3t^2$, $y=-2(t-1)$, $z=3e^{3t-3}$ $x=2+3t^3$, $y=-2(t-1)t$, $z=1+3e^{3t-3}t$ $x=2+3t$, $y=-2(t-1)$, $z=1$

A particle's velocity is given by $\check{(}t) = e^{-t} \subset +e^{t} \supset +2t$, $t \geq 0$. If the particle is initially at the point $(2,1,1)$, where is it at time $t=1$? $(3-e^{-1},e,2)$ $(-e^{-1},e,1)$ $(2-e^{-1},1+e,2)$ $(-e^{-t},e^{t},t^2)$ $(2-e^{-t},1+e^{t},1+t^2)$

Calculate the length of the curve $(t) = 3t \subset +t^2 \supset +\frac{4\sqrt{3}}{3}t^{3/2}$ from $t=0$ to $t=2$. 10 8 6 4 1

Suppose a particle's position is given by $(t) = \sin(t) \subset +t \supset +t^2$. The tangential component of the particle's acceleration $(t) = a(t)(t) + a(t)(t)$ is

$$a(t) = \frac{4t - \cos(t)\sin(t)}{\sqrt{\cos^2(t) + 4t^2 + 1}}$$

Use this to find the normal component of the acceleration $a(t)$ when $t=\pi$. $a(\pi) = \frac{2}{\sqrt{1+2\pi^2}}$ $a(\pi)=2$ $a(\pi) = \frac{4\pi}{\sqrt{2+4\pi^2}}$ $a(\pi)=4$ $a(\pi)=\sqrt{2+4\pi^2}$

Compute the limit $\lim_{(x,y)\to(1,0)} \frac{(x-1)^2 y}{(x-1)^2+y^2}$. 0 ∞ *does not exist* 1 $\frac{3}{2}$

Determine which of the functions below has the following level curves:

$f(x, y) = x^2 - y^2$ $f(x, y) = x^2 + y^2$ $f(x, y) = y - x^2$ $f(x, y) = x - y^2$ $f(x, y) = xy$