Math 225: Calculus III Name:______________________________

Exam I *February 16, 1995* 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 6 points each. You start with 10 points.

Let $= 2 \subset - \supset +3$ and $= - \subset +5 \supset$. Compute $\times$-15ı-3ȷ+9-2ı-5ȷ10ı+3ȷ--5ı+13ȷ-6ı+4ȷ

Three vertices of a parallelogram are $(1, 2)$, $(3, 3)$, and $(2, 4)$. Determine which of the following points could be the fourth vertex. $(4, 5)$ $(3, 0)$ $(0, 4)$ $(0, 0)$ $(3, 1)$

Compute the angle between the planes $x + y + z = 3$ and $4x - 3y = 1$. 1.455 radians 1.571 radians 0.785 radians 1.047 radians 1.134 radians

Find the equation of the line that passes through the points $(3, -1, 0)$ and $(4, 5, 1)$. $x = 3+t$, $y = -1+6t$, $z = t$ $x = 1 + 3t$, $y = 6 - t$, $z = 0$ $x = 3 + 4t$, $y = -1 + 5t$, $z = t$ $x = 4 + 3t$, $y = 5 - t$, $z = 0$ $x = 3t$, $y = 6t$, $z = t$

Determine which of the vector functions below defines the following curve:

$(t) = \sin(t) \subset +t \supset + \cos(t)$ $(t) = \cos(t) \subset - \sin(t) \supset +t$ $(t) = \cos(t) \subset + \sin(t) \supset +t$ $(t) = t \subset + \cos(t) \supset + \sin(t)$ $(t) = t \subset - \sin(t) \supset + \cos(t)$

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

The position of a particle at time t is given by $(t) = (t^3 - t) \subset +(t^2 - t) \supset +2t$. Find the direction in which the particle is moving at time $t = 1$. $2 \subset + \supset +2$ $3 \subset +2 \supset +2$ $(3t^2 - 1) \subset +(2t - 1) \supset +2$ $6 \subset +2 \supset$ $-\frac{1}{4} \subset -\frac{1}{6} \supset +$

Compute the unit normal vector to the curve defined by $(t) = (\cos(t) + t) \subset +(t - \cos(t)) \supset +\sqrt{2}\sin(t)$ $(t) = -\frac{1}{\sqrt{2}}\cos(t) \subset +\frac{1}{\sqrt{2}}\cos(t) \supset -\sin(t)$ $(t) = -\cos(t) \subset +\cos(t) \supset -\sqrt{2}\sin(t)$ $(t) = \frac{1}{\sqrt{2}}\sin(t) \subset -\frac{1}{\sqrt{2}}\sin(t) \supset +\cos(t)$ $(t) = -\cos(t) \subset -\cos(t) \supset +\sin(t)$ $(t) = \frac{1}{\sqrt{2}}\cos(t) \subset +\cos(t) \supset -\frac{1}{\sqrt{2}}\sin(t)$

Find the tangential component of acceleration, $a_T(t)$, of a particle whose motion is described by

$$(t) = (e^t + e^{-t}) \subset +(e^t - e^{-t}) \supset$$

$\frac{\sqrt{2}(e^{2t}-e^{-2t})}{\sqrt{e^{2t}+e^{-2t}}}$ $\sqrt{2(e^{2t} + e^{-2t})}$ $(e^t + e^{-t}) \subset +(e^t - e^{-t}) \supset$ $2(e^{2t} + e^{-2t})$ $\frac{(e^t+e^{-t})}{\sqrt{e^{2t}+e^{-2t}}} \subset +\frac{(e^t-e^{-t})}{\sqrt{e^{2t}+e^{-2t}}} \supset$

Determine which of the following integrals gives the length of the curve defined by $(t) = t^2 \subset +(t^3 - t) \supset +t^5$, $0 \le t \le 2$. $\int_0^2 \sqrt{25t^8 + 9t^4 - 2t^2 + 1}\,dt$ $\int_0^2 2t \subset +(3t^2 - 1) \supset +5t^4\,dt$ $\int_0^2 \sqrt{5t^4 + 3t^2 + 2t - 1}\,dt$ $\int_0^2 \sqrt{t^{10} + t^6 + t^4 - 2t^3 + t^2}\,dt$ $\int_0^2 \frac{1}{3}t^3 \subset +(\frac{1}{4}t^4 - \frac{1}{2}t^2) \supset +\frac{1}{6}t^6\,dt$

Compute the distance from the point $(1, 3, 7)$ to the line $x = 2 - t$, $y = 6 + 2t$, $z = 3t$. 6.38 5.27 4.16 7.49 3.05

Calculate the distance from the point $(-1, -1, 1)$ to the plane $x + y + z = 5$. $2\sqrt{3}$ $\frac{5}{\sqrt{3}}$ $5\sqrt{3}$ $\frac{\sqrt{3}}{2}$ $\sqrt{6}$

Determine the equations of the line tangent to the curve $(t) = 3t^2 \subset -t \supset +(t^3 - 1)$ at the point $(12, -2, 7)$ $x = 12 + 12t,\ y = -2 - t,\ z = 7 + 12t$ $x = 12 + 6t,\ y = -3,\ z = 7 + 3t^2$ $x = 12 + 6t^2,\ y = -3t,\ z = 7 + 3t^3$ $x = 12 + 6t,\ y = -2 - t,\ z = 7 + 3t$ $x = 12 + 12t,\ y = -2,\ z = 7 + 6t$

Compute the limit $\lim_{(x,y)\to(1,1)} \frac{(xy-x+y-1)^2}{xy^2-2xy+x}$ 4 *exists, but has many possible values* 0 *does not exist* $\frac{1}{2}$

Let $f(x, y) = e^{2x}(y^3 - xy) + xy^2$. Compute $f_{xy}(2, 5)$. $145e^4 + 10$ $75e^4 + 10$ $150e^4$ $2e^4 + 10$ $115e^4 + 25$