Math 225: Calculus III Name:________________________

Exam I *September 26, 1991* 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.

Find a unit vector parallel to the line $x = -1 + 2t, \quad y = 2 - t, \quad z = 3t$. $0.53 \subset -0.27 \supset +0.80$ $-0.45 \subset +0.89 \supset$ $0.58 \subset -0.58 \supset +0.58$ $-0.71 \subset +0.71 \supset$

Find a vector perpendicular to the plane $2x - 3y + 5z = 27$. $2 \subset -3 \supset +5$ $3 \subset -2 \supset$ $5 \subset +5 \supset +$ $\frac{1}{\sqrt{38}}(\subset - \supset +)$ $\frac{1}{\sqrt{3}}(\subset + \supset +)$

Compute the angle in radians between the vectors $= \subset - \supset +$ and $= 2 \subset + \supset$. 1.31 1.24 1.57 2.03 1.87

Determine the projection of the vector $= 2 \subset + \supset +$ onto the vector $= \subset + \supset +$ $1.33 \subset +1.33 \supset +1.33$ $2.68 \subset +0.67 \supset -0.67$ $0.67 \subset +0.67 \supset +0.67$ $5.32 \subset +1.33 \supset -1.33$ $0.58 \subset +0.58 \supset +0.58$

Find the area of the parallelogram with vertices $(0,0)$, $(3,1)$, $(2,4)$, $(5,5)$. 10 5 $\sqrt{12}$ 15 $5\sqrt{5}$

Determine the parametric equations of the line through the points $(1,-1,1)$ and $(2,0,5)$. $x = 1 + t, \quad y = -1 + t, \quad z = 1 + 4t$ $x = 1 + 2t, \quad y = -1, \quad z = 1 + 5t$ $x = 2 + t, \quad y = -t, \quad z = 5 + t$ $x = 1 + 3t, \quad y = -1 - t, \quad z = 1 + 6t$ $x = 1 + t, \quad y = 1 - t, \quad z = -4 + 5t$

Compute the distance from the point $(2,1,1)$ to the line $x = t, \quad y = 2t, \quad z = 3t$. 1.58 1.32 1.79 2.05 2.25

Find the equation of the plane through the origin that is parallel to the vectors $= \subset + \supset +$ and $= \subset$. $y - z = 0$ $x + y + z = 0$ $x + y - z = 0$ $x - y = 0$ $x - z = 0$

Determine the distance of the plane $3x - y + 2z = 6$ to the origin. 1.6 2.0 0.8 1.2 1.0

Let $(t) = e^t \subset +e^{-t} \supset +t$. Compute $'(0)$. $\subset - \supset +$ $\subset - \supset$ $e^t \subset -e^{-t} \supset +t$ $e^t \subset +e^{-t} \supset +$ $\subset + \supset +$

Which of the following curves is not smooth at some point in its domain? $(t) = t^2 \subset +t^3 \supset +t^5$ $(t) = t \subset +t^2 \supset +t^3$ $(t) = (t + t^2) \subset +t^3 \supset +(t-1)^5$ $(t) = \cos(t) \subset + \sin(t) \supset +t$ $(t) = e^t \subset +e^{-t} \supset +t$

Find a parameterization of the graph of the function $f(x) = x^3 - x$. $(t) = t \subset +(t^3 - t) \supset$ $(t) = (t^2 - 1) \subset +t \supset$ $(t) = (t-1) \subset +t(t+1) \supset$ $(t) = t \subset +t^3 \supset -t$ $(t) = t \subset +(t^2 - 1) \supset$

Suppose a particle initially at rest has the following acceleration $(t) = t \subset +t^2 \supset +t^3$, $t \geq 0$. Calculate the particle's speed at $t = 1$. 0.65 0.45 0.85 1.05 1.25

Suppose $(t) = e^t \subset +t \supset -\frac{1}{t}$. Compute $\int_1^2 (t)\, dt$. $4.67 \subset +1.50 \supset -0.69$ $7.39 \subset +2.00 \supset -0.69$ $4.67 \subset +0.75 \supset$ $8.70 \supset$ $2.72 \subset +1.00 \supset -0.25$

Which of the following integrals gives the length of the curve $(t) = t\cos(t) \subset +t\sin(t) \supset +t^2$, $0 \leq t \leq \pi$? $\int_0^\pi \sqrt{1 + 5t^2}\, dt$ $\int_0^\pi \sqrt{t(\cos(t) + \sin(t) + t)}\, dt$ $\int_0^\pi \sqrt{\sin(t) - \cos(t) + 2t}\, dt$ $\int_0^\pi \sqrt{1 + t^2}\, dt$ $\int_0^\pi 2t\, dt$

Find the equation of the line tangent to the curve $(t) = (1 - t^2) \subset +t^3 \supset +(1 + t^4)$ at the point $(0,1,2)$. $x = -2t, \quad y = 1 + 3t, \quad z = 2 + 4t$ $x = -2t, \quad y = 3t^2, \quad z = 4t^3$ $x = 1 - 2t, \quad y = 3t, \quad z = 1 + 4t$ $x = -2t, \quad y = 1 + 3t^2, \quad z = 2 + 4t^3$ $x = t, \quad y = 1, \quad z = 2 + t$

Suppose a particle's motion is described by $(t) = t\cos(t) \subset +t\sin(t) \supset +t^2$. Calculate the tangential component of the particle's acceleration. $\frac{5t}{\sqrt{1+5t^2}}$ $\frac{4t}{\sqrt{2+4t^2}}$ $\frac{-\sin(t) \subset - \cos(t) \supset +2t}{\sqrt{1 + 4t^2}}$ $\frac{1}{\sqrt{5}}(-\cos(t) \subset -\sin(t) \supset +2)$ $\frac{1}{\sqrt{1+5t}}$