

ANAYTIC GEOMETRY AND CALCULUS III

Exam I

September 29, 1994

The point value of each problem is indicated in the left margin. You must show all of your work for full credit. Points will be deducted for faulty reasoning, for sloppy notation, and for failure to simplify answers, even if your answer is correct. You may use a calculator, your class notes, and any reference material. Explicitly cite, in some manner, any published formulae you use.

(10) 1. Find a vector equation for the plane $x - 3y + 2z = -12$

Answer _____

(10) 2. Find $\cos \theta$ where θ is the angle between the planes $2x + 3y - z = -3$ and $4x + 5y + z = 1$.

Answer $\cos \theta =$ _____

(80) 3. Let $\mathbf{r}(t) = t\mathbf{i} + \frac{1}{2}t^2\mathbf{j}$.

(a) Find \mathbf{v} .

Answer $\mathbf{v}(t) =$ _____

(b) Find ν .

Answer $\nu(t) =$ _____

(c) Find \mathbf{a} .

Answer $\mathbf{a}(t) =$ _____

(d) Find $\mathbf{T}(1)$

Answer $\mathbf{T}(1) =$ _____

(e) Find $\mathbf{v}(1) \times \mathbf{a}(1)$

Answer $\mathbf{v}(1) \times \mathbf{a}(1) =$ _____

(f) Use the formula $\kappa = \frac{|\mathbf{v} \times \mathbf{a}|}{\nu^3}$ to find $\kappa(1)$.

Answer $\kappa(1) =$ _____

(g) Find $\frac{d\nu}{dt}(1)$.

Answer $\frac{d\nu}{dt}(1) =$ _____

(h) Use the formula $\mathbf{a} = \frac{d\nu}{dt} \mathbf{T} + \kappa\nu^2 \mathbf{N}$ to find $\mathbf{N}(1)$.

Answer $\mathbf{N}(1) =$ _____