

Math 13 Fall 2009: Exam 1

Name:

Instructions: Each problem is scored out of 8 points for a total of 32 points. You may not use any outside materials(eg. notes or calculators). You have 50 minutes to complete this exam. Remember to fully justify your answers.

Score:

Problem 1.

- (a) Find the equations of the planes given by the following information.
- (1) Perpendicular to the line $\langle 2 + t, 2t, 1 + t \rangle$ and containing the point $(1, 2, 0)$.
 - (2) Containing the vectors $\langle 0, 1, 1 \rangle$ and $\langle 1, 0, 2 \rangle$ and containing the point $(1, 0, 1)$.
- (b) Find an equation for their line of intersection.

Problem 2. Let C be the curve of intersection of the two surfaces $y = \frac{2}{x}$ and $z = \frac{4x^2}{3y}$.

(a) Find parametric equations for C .

(b) Set-up the integral for the length of the curve C from $(1, 2, \frac{2}{3})$ to $(2, 1, \frac{16}{3})$.

Problem 3. A particle starts ($t = 0$) at the origin with initial velocity $\vec{v}(0) = \hat{i} + \hat{j} - \hat{k}$. Its acceleration is given by $\vec{a}(t) = t\hat{i} + \hat{j} + t\hat{k}$.

- (a) Find $\vec{r}(t)$.
- (b) Find the curvature at $(\frac{10}{3}, 4, -\frac{2}{3})$.
- (c) Find a_T and a_N at $(\frac{10}{3}, 4, -\frac{2}{3})$.

Problem 4. Given vectors \vec{a} and \vec{b} show that

$$\vec{c} = |b|\vec{a} + |a|\vec{b}$$

bisects the angle between \vec{a} and \vec{b} .