Name: ______________________________

September 10$^{\text{th}}$, 2014.
Math 2401; Sections D1, D2, D3.
Georgia Institute of Technology
Exam 1

I commit to uphold the ideals of honor and integrity by refusing to betray the trust bestowed upon me as a member of the Georgia Tech community. By signing my name below I pledge that I have neither given nor received help on this exam.

Pledged: ______________________________

Problem	Possible Score	Earned Score
1	20	
2	20	
3	10	
4	20	
5	20	
6	10	
Total	100	

Remember that you must SHOW YOUR WORK to receive credit!

Good luck!

1. [20 pts.] Given the vectors $\vec{v_1} = \langle 1, 0, 2 \rangle$ and $\vec{v_2} = \langle -1, 2, 3 \rangle$:
a). Find $\vec{v_1} \cdot \vec{v_2}$.

b). Find $\vec{v_1} \times \vec{v_2}$.

c). Find the angle between $\vec{v_1}$ and $\vec{v_2}$. Give an exact answer.

d). Find a (simplified) component equation for the plane determined by the points $(0, 0, 0)$, $(1, 0, 2)$ and $(-1, 2, 3)$.

2. [20 pts.] Find parametric equations for the line that is tangent to the curve:

$$\vec{r}(t) = \left(\ln \frac{t}{3}\right)\vec{i} + \left(\frac{t-3}{t+6}\right)\vec{j} + \left(t \ln \frac{t}{3}\right)\vec{k},$$

at the point on the curve where $t = 3$.

3. [10 pts.] Express the vector $\overrightarrow{P_1P_2}$ in the form $a\vec{i} + b\vec{j} + c\vec{k}$, where P_1 is the point $(4, -3, 8)$ and P_2 is the point $(-9, -9, 6)$.

4. [20 pts.] Evaluate the integral:

$$\int_0^1 \left[\left(6te^{3t^2}\right)\vec{i} + \left(6e^{-6t}\right)\vec{j} + 5\pi\vec{k}\right]\,dt.$$

Give exact answers.

5. [20 pts.] Given the curve:

$$\vec{r}(t) = \left\langle -\sqrt{2}e^t \cos(t), \; -\sqrt{2}e^t \sin(t), \, 2 \right\rangle,$$

find:
a). The unit tangent vector $\vec{T}(t)$.

b). The unit normal vector $\vec{N}(t)$.

c). The curvature κ.

6. [10 pts.] Consider the curve:

$$\vec{r}(t) = \left\langle 0,\ \cos^3(t),\ \sin^3(t) \right\rangle,\ -\frac{\pi}{2} \leq t \leq 0.$$

Find the length of the curve on the given parameter domain.

Name: ____

October 1st, 2014.
Math 2401; Sections D1, D2, D3.
Georgia Institute of Technology
Exam 2

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Pledged: ____

Problem	Possible Score	Earned Score
1	20	
2	15	
3	15	
4	15	
5	20	
6	15	
Total	100	

Remember that you must SHOW YOUR WORK to receive credit!

Good luck!

1. [20 points] Consider the function:

$$h(x, y) = \frac{x^2 + y}{y}$$

a. Find the limit of $h(x, y)$ as $(x, y) \to (0, 0)$ along linear paths $y = kx$.

b. Can you conclude from part *a.* that:

$$\lim_{(x,y)\to(0,0)} h(x, y) = 1?$$

Justify your answer briefly.

c. Find the limit of $h(x, y)$ as $(x, y) \to (0, 0)$ along parabolic paths $y = kx^2$.

d. What conclusions can you draw from the results you obtained in part *c.* about $\lim_{(x,y)\to(0,0)} h(x, y)$?