Test 1 Math 271

Place your name in the upper right corner. Place your answers in the blank spaces to the left of the questions. Show your work on a separate sheet. Staple your work to the test when you hand it in. Relax, enjoy and have fun.

For the following 14 problems consider the three vectors,

\[ \vec{a} = (1, 0, 1) \quad \vec{b} = (0, 1, 1) \quad \vec{c} = (-1, -1, 1) \]

1) Compute \( \vec{a} \cdot \vec{b} \).
2) Compute \( \vec{a} \cdot \vec{c} \).
3) Compute \( \vec{c} \cdot \vec{b} \).
4) Compute \( \vec{a} \cdot \vec{b} \).
5) Compute \( \vec{a} \cdot \vec{c} \).
6) Compute \( \vec{c} \cdot \vec{b} \).
7) Compute \( |\vec{a}| \).
8) Compute \( |\vec{b}| \).
9) Compute \( |\vec{c}| \).
10) What is the angle between \( \vec{a} \) and \( \vec{b} \). (Radians! Use 5 decimals.)
11) What is the angle between \( \vec{a} \) and \( \vec{c} \). (Radians! Use 5 decimals.)
12) What is the angle between \( \vec{c} \) and \( \vec{b} \). (Radians! Use 5 decimals.)
13) Find an equation of a line along \( \vec{a} \) containing the point \((1,1,1)\).
14) Find an equation of a plane containing the lines \( \vec{r} = t\vec{a} \) and \( \vec{r} = t\vec{b} \).
15) On your work sheet show that the line, \( \frac{x-1}{3} = \frac{y+5}{3} = \frac{z+5}{3} \), is in the plane \( x - 2y + 3z = 4 \).

For the following 5 problems consider the curve, \( \vec{r} = (e^t \cos(t), e^t \sin(t), e^t) \).

_________________________ 16) Compute the velocity.

_________________________ 17) Compute the acceleration.

_________________________ 18) Normalize the velocity so that it is a unit vector.

_________________________ 19) Compute the arc-length between 0 and \( t \).

_________________________ 20) Change \( \vec{r}(t) \) to a unit speed curve \( \vec{r}(s) \).

(SIMPLIFY YOUR ANSWER!)
Test 1 Math 271, Part 2

For this part of the test do all the problems either on a TI - 92 or with MAPLE. You may do some work by hand, but do not use tables. If you forgot some of the MAPLE code, ask me. Have fun!

1) $\int \sin^2(x)\cos^3(x) \, dx$

2) $\int \sin(2x)\cos(3x) \, dx$

3) $\int x \, dx$

4) $\int \left[ \sin^2(x) + x \cdot e^{\ln(x)} + \cos^2(x) \cdot 1 \right] \, dx$

5) $\int \frac{dx}{1 + \frac{1}{x}}$

6) $\int \frac{dx}{x}$

7) $\frac{d}{dx} \left( \sin(ax^2) \right)$

8) $\frac{d}{dx} \left( \tan(3ax) \right)$

9) $\frac{d}{da} \left( \sin(a^2x) \right)$