Quiz #2

Math 251 Key February 1, 2024

The solutions for this quiz MUST be submitted in gradescope by 11:55pm on Thursday, February 1, 2024.

You will be graded on both the correct answer and the correctness of the work that you provide to justify that answer. I expect to see all of your work in a neat and orderly manner.

You are allowed to your your class notes and a calculator when working the quiz. However, I would suggest trying to do quiz without using any other resources to see if you actually know the material. You are not allowed to ask other people for help with the questions. If you need clarification on a question, send me an e-mail or ask me in person.

You do not need to turn in this cover sheet when you submitt your work. You are expected to tell webassign where on what pages your questions are located.

I would suggest setting an alarm on your phone so that you do not forget to submit the quiz. You can submitt multiple time to gradescope. Only the last submission is graded.

1. (3 points) Let $\mathbf{c} = \langle 1, 3, 4\rangle$ and $\mathbf{d} = \langle 6, 0, 2\rangle$. Compute $\mathbf{d} \times \mathbf{c}$
2. (2 point) Find the parametric equation of a line through the point $(1, 3, 7)$ that will be perpendicular to the plane $x + 2y + 10z = 20$.
3. (3 points) Find an equation of the plane that contains these lines that are not skew.
   $\mathbf{r}_1(t) = \langle 1 + t,\ 1 - t,\ 2t\rangle$
   $\mathbf{r}_2(s) = \langle 2 - s,\ s,\ 2\rangle$
4. (2 points) At what point does the curve $\mathbf{r}(t) = \langle t - 1, 1 + 2t, 3 - t\rangle$ intersect the plane $3x - y + 2z = 5$? If it does not intersect, then explain why you know this.

Quiz 2 Key

1] $$u \times v = \begin{vmatrix} i & j & k \\ 6 & 0 & 2 \\ 1 & 3 & 4 \end{vmatrix} = (0-6)i - (24-2)j + (18-0)k$$

$$= \langle -6, -22, 18 \rangle$$

2] perpendicular to the plane means the normal vector of the plane is also a direction vector of the Line.

$n = \langle 1, 2, 10 \rangle = v$ point $(1, 3, 7)$

Answer $x = 1 + t$
$y = 3 + 2t$
$z = 7 + 10t$

or $r(t) = \langle 1+t, 3+2t, 7+10t \rangle$

3] Since the lines are not skew, all I need is a point on one of the lines.

Let $t=0$ and we get $(1,1,0)$ as a point

need normal vector

$$V_1 \times V_2 = \begin{vmatrix} i & j & k \\ 1 & -1 & 2 \\ -1 & 1 & 0 \end{vmatrix}$$

$$= (0-2)i - (0-(-2))j + (1-1)k$$

$$= \langle -2, -2, 0 \rangle$$

Plane

$$-2(x-1) - 2(y-1) + 0(z-0) = 0$$

$$-2(x-1) - 2(y-1) = 0$$

or. $-2x - 2y = (-2)(1) + (-2)(1)$

$$-2x - 2y = -4$$

or $2x + 2y = 4$

$$x + y = 2$$

note lines intersect at $t=1$ and $s=0$
point is $(2,0,2)$

4]

$3(t-1) - (1+2t) + 2(3-t) = 5$

$3t - 3 - 1 - 2t + 6 - 2t = 5$

$-t + 2 = 5$

$-t = 3$

$t = -3$

$r(-3) = \langle -4, -5, 6 \rangle$

Intersection point is $(-4, -5, 6)$