Review after Midterm 2

Final exam 4:30–6:30pm, May 13. Extra office hour: Monday, May 11, 2:30-4:30pm.

On (Vectors and vector function and geometry of Spaces Chapter 12 and 13).

Vectors and vector functions: Algebraic operation, vector products (Dot and cross, and scalar triple); Geometric meanings (addition, subtraction, dot product, cross product and mixed product); Derivative and integral of vector functions; representations of line and plane in space.

Exercise 1. (a). Find value x so that vectors $\mathbf{a} = (1, x, -2)$, $\mathbf{b} = (2, 0, -1)$ and $\mathbf{c} = (1, 1, -1)$ are on the same plane.

(b). Are the following four points on the same plane: A (1, 3, 5), B(1, 0, 2), C(3, 2, 1) and D(2, 1, 1)?

Exercise 2: (a). Do the following two line intersect each other? If yes, find the plane to contain them: $\mathbf{r} = (1, 2, 3) + t(2, 3, 1)$; $\mathbf{r} = (2, 2, 1) + t(1, 3, 1)$.

(b). Find the line equation which passes through $(1, 0, 2)$ and parrels both planes: $x + y - z = 2$; and $2x + z = 1$.

(C). Find the equations of the planes that contain two lines: $\mathbf{r}_1(t) = (1, 0, 2)t - (1, 2, 3)$, and $\mathbf{r}_2(t) = (2, 0, 1)t + (1, 1, 1)$.

Exercise 3: Show that the distance between the given parallel planes $ax + by + cz = d_1$ and $ax + by + cz = d_2$ is

$$distance = \frac{|d_1 - d_2|}{\sqrt{a^2 + b^2 + c^2}}.$$

Curvature: Arc length and re-parametrization; Tangent to a space curve; Curvature (the definition and formulas).

Exercise 4: (a). Find the curvature at $t = \pi$ for $x = \cos t,\ y = 2\sin t$.

(b).Show that the curvature of a plane curve: $x = f(t),\ y = g(t)$ is given

$$\kappa = \frac{|x'y'' - y'x''|}{[x'^2 + y'^2]^{3/2}}.$$

Exercise 5: If $|\mathbf{u}(t)|^2 = 2$, find $|\mathbf{u}(t) \times \mathbf{u}'(t)| =$.

WARNING: YOU ARE RESPONSIBLE FOR CHECKING OUT MY TYPOS!

Comments and question to: mzhu@math.ou.edu