Formula sheet for Math 233, Oct. 14

This is the only formula sheet that you can bring to the exam I on Oct. 14. No other formulas are allowed to write on this sheet. There will be no formula sheet provided in the exam II.

- $$\mathbf{a} \cdot \mathbf{b} = a_1b_1 + a_2b_2 + a_3b_3 = \|\mathbf{a}\|\|\mathbf{b}\| \cos\theta$$

- $$\mathbf{a} \times \mathbf{b} = \begin{bmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ \mathbf{a_1} & \mathbf{a_2} & \mathbf{a_3} \\ \mathbf{b_1} & \mathbf{b_2} & \mathbf{b_3} \end{bmatrix}$$

  $$|\mathbf{a} \times \mathbf{b}| = \|\mathbf{a}\|\|\mathbf{b}\| \sin\theta$$

- The equation of plane through (x_0, y_0, z_0) with normal vector $\langle a, b, c\rangle$ is

  $$a(x - x_0) + b(y - y_0) + c(z - z_0) = 0$$

- The equation of a line through (x_0, y_0, z_0) with direction vector $\langle a, b, c\rangle$ is

  $$\mathbf{r}(t) = \langle x - x_0, y - y_0, z - z_0\rangle + t\langle a, b, c\rangle$$

  symmetric equation

  $$\frac{x - x_0}{a} = \frac{y - y_0}{b} = \frac{z - z_0}{c}$$

  Parametric equation:

  $$x = x_0 + at.\ \ y = y_0 + bt\ \ z = z_0 + ct$$

- The arclength of an arc $\mathbf{r}(t) = \langle x(t), y(t), z(t)\rangle$, for $a \le t \le b$ is

  $$\int_a^b \sqrt{|x'(t)|^2 + |y'(t)|^2 + |z'(t)|^2}dt.$$