Math 120-Recitation Week 5

1. Find the Maclaurin series of $(2+3x^2)^{1/10}$ and state the open interval that it converges to the function.

2. Find the Taylor series expansion of $\dfrac{1}{x(x+3)}$ about the point $a=1$.

3. In the following describe and sketch the set of points in $\mathbb{R}^3$ that satisfy the given pair of equations and inequalities:

a) $x=1, \quad z=3$ b) $x^2+y^2=4, \quad z \geq y$ c) $x^2+y^2+z^2=9, \quad z=x$

4. Let $A=(1,2), B=(3,4)$ and $C=(5,-4)$ be vertices of a triangle. Using vector methods find the point G where the medians of the triangle meet. Find the vector and scalar projection of the vector represented by $\vec{BG}$ on the vector represented by $\vec{BC}$.

5. (Just as a supplement to the material that will be covered in the lecture)

a) Show that $|\mathbf{a}+\mathbf{b}|^2 = |\mathbf{a}|^2 + 2\ \mathbf{a}\cdot\mathbf{b} + |\mathbf{b}|^2$

b) Show that $\mathbf{a}\cdot\mathbf{b}\ \leq |\mathbf{a}|\ |\mathbf{b}|$ (Cauchy-Schwarz Inequality)

c) Deduce from (a) and (b) that $|\mathbf{a}+\mathbf{b}|\ \leq |\mathbf{a}| + |\mathbf{b}|$ (Triangle Inequality)

6. a) Find the symmetric equations for the line that passes through the point $(0,2,-1)$ and is parallel to the line with parametric equations $x=1+2t, \quad y=3t, \quad z=5-7t$.

b) Find the points in which the line in part a) intersect the coordinate planes.

7. Let L_1 and L_2 be the lines given by the parametric equations

L_1: $x=1+2t, \quad y=1+9t, \quad z=2-t,$

L_2: $x=-1+t, \quad y=4+t, \quad z=1+3t.$

Determine whether L_1 and L_2 are parallel, intersecting or skew. If they intersect find the intersection point.

8. Find the distance d from the point $(2,1,0)$ to the line with equations
$x=-2, \quad y+1=z.$