Calculus II Test 3 NAME_____

DIRECTIONS: Books and notes not allowed. Justify answers by giving appropriate arguments and steps. Write clearly and organize your work, or it will not receive credit. Circle answers.

1. Find the radius and interval of convergence for:

(A)(10p) $\displaystyle\sum_{n=1}^{\infty} \frac{(x-3)^n}{n^2}$

(B) (10p) $\displaystyle\sum_{n=0}^{\infty} \frac{x^n}{5^n}$

2. (10p) Use the geometric series to find the general form of the Maclaurin power series representation of the following function $F(x) = \frac{1}{4-x^2}$.

3. (5p) Use the binomial theorem to find the first five terms in the expansion of $(1+x)^{10} = a_0 + a_1 x + a_2 x^2 + \dots$ Simplify all coefficients.

4. Let $F(x) = \sin x$.

(A) (8p) Find the 2nd degree Taylor polynomial $T_2(x)$ at $a = \frac{\pi}{6}$ for $F(x)$.

(B) (7p) Estimate the error $|R_2(x)| = |F(x) - T_2(x)|$ for all x.

5. (10p) Let $g(x) = \frac{1}{1+x}$. Find the the first four terms in the Maclaurin series of $F(x) = g(x) \cdot g'(x)$.

6. (16p) Let $\vec{V} =< 5, -3, 2 >$ and $\vec{W} =< 1, 1, 1 >$.
(A) Find the scalar product $\vec{V} \cdot \vec{W}$.

(B) Find the cosine of the angle between $\vec{V}$ and $\vec{W}$.

(C) Find the vector projection of $\vec{V}$ onto $\vec{W}$.

(D) Find the vector projections of $\vec{V}$ onto each of the vectors $\vec{\mathbf{i}}$, $\vec{\mathbf{j}}$, and $\vec{\mathbf{k}}$.

7. (8p) Find symmetric equations for the line containing the points $A : (2, -3, 1)$ and $B : (-3, 0, 7)$.

8. (8p) Let $P : (2, 1, 3)$, $Q : (1, 1, 1)$, $R : (3, 1, 2)$ be three points.
(A) Find a normal vector $\vec{N}$ normal to the plane containing P, Q, and R.

(B) Find an equation of the plane containing P, Q, and R.

9.(8p) Find the line of intersection for the planes $x+2y+3z = 0$ and $2x+y-z = 0$.