 Name:________________________________

1) Find a power series representation for $\frac{x^4}{1+x^3}$. (Include a formula for the nth term and a formula for the summation). Then find the interval of convergence for the series.

2) Find the first three nonzero terms for the Taylor Polynomial generated by

$f(x) = \cos 2x$ at $x = \frac{\pi}{2}$.

B) Show that $|f(x)-P_4(x)| < \frac{1}{2000000000}$ between $\frac{23\pi}{45} < x < \frac{\pi}{2}$

C) Find $\left|f\left(\frac{23\pi}{45}\right)-P_4\left(\frac{23\pi}{45}\right)\right|$

3) a) Find the Taylor polynomial of order 10 for $f(x) = \ln(1 + x^5)$ at $x = 0$.

b. Show that $|f(x)-P_{10}(x)| \leq 5 \times 10^{-20}$ between $0 < x < .05$

4) a) Find the Taylor polynomial of order 2 for $f(x) = \tan^{-1}x^2$ at $x = 0$.

B) Show that $|f(x) - P_2(x)| < \frac{3}{100000}$ between $0 < x < .2$

C) Find $|f(.2) - P_4(.2)|$

5) Let f be a function that has derivatives of all orders on the interval $(-\infty, \infty)$. Assume that $f(3) = -2$, $f'(3) = 5$, $f''(3) = -21$, and $f'''(3) = 40$.

(a) Find the third-order Taylor polynomial about $t = 3$ for $f(t)$,

(b) Find the second-order Taylor polynomial about $t = 3$ for $f'(t)$,

(c) Find the fourth-order Taylor polynomial about $t = 3$ for

$$\int_0^x f(t)\,dt$$

(d) Find the third-order Taylor polynomials for $h(x) = f(5x)$

6) Use a familiar MacClaruin series to help you integrate the following. Make sure you include a rule for the nth term and a rule for the sum.

$$\int \frac{\ln(1+t^2)}{t} =$$

7) Use a familiar MacClaruin series to help you integrate the following. Make sure you include a rule for the nth term and a rule for the sum.

$$\int \tan^{-1}(x^4) =$$

8) Use a familiar MacClaruin series to help you integrate the following. Make sure you include a rule for the nth term and a rule for the sum.

$$\int \frac{x^4}{1-x^2} =$$