Quiz 4a **Calculus 2** **3/19/04**

Each problem is worth 5 points. For full credit provide proper justification for your answer.

1. Find the Taylor polynomial of degree 3 approximating the function $f(x) = \sqrt[3]{1+x}$ for x near zero.

$f(x) = \sqrt[3]{1+x} \to (1+x)^{1/3}$ $\quad f(0) = 1$

$f'(x) = \frac{1}{3}(1+x)^{-2/3}$ $\quad f'(0) = \frac{1}{3}$

$f''(x) = -2/9\,(1+x)^{-1\,2/3}$ $\quad f''(0) = \frac{-2}{9}$

$f'''(x) = \frac{10}{27}(1+x)^{-2\,2/3}$ $\quad f'''(0) = \frac{10}{27}$

$$P(x) = f(0) + f'(0) + \frac{f''(0)}{2!}x^2 + \frac{f'''(0)}{3!}x^3$$

$$P(x) = 1 + \frac{1}{3} + \frac{\frac{-2}{9}}{2}\cdot x^2 + \frac{\frac{10}{27}}{6}\cdot x^3$$

Great Job

$$\boxed{P(x)_3 = 1 + \frac{1}{3}x + \frac{-1}{9}x^2 + \frac{5}{81}x^3}$$

2. Find the Taylor polynomial of degree 5 for the function $g(x) = \sin x$ centered at $x = 0$.

$f(x) =$	$\sin x$	$f(0) \to$	0
$f'(x) =$	$\cos x$	$\to$	1
$f''(x) =$	$-\sin x$	$\to$	0
$f'''(x) =$	$-\cos x$	$\to$	-1
$f^{4}(x) =$	$\sin x$	$\to$	0
$f^{5}(x) =$	$\cos x$	$\to$	1

Take the derivative to the 5th deg. put in 0 to each derivative + then put those #'s in to find the coefficients in the Taylor Polynomial.

Good

$$= 0 + 1x + \frac{0}{2}x^2 + \frac{-1}{6}x^3 + \frac{0}{24}x^4 + \frac{1}{120}x^5$$

$$\boxed{= 1x - \frac{1}{6}x^3 + \frac{1}{120}x^5}$$