Quiz 4a **Calculus 2** **3/25/2005**

Each problem is worth 5 points. Clear and complete justification is required for full credit.

1. Find the Taylor polynomial of degree 3 for the function $f(x) = \sqrt{1+x}$ near 0.

$(1+x)^{1/2}$

$f(x) = \sqrt{1+x}$ $\quad f(0) = 1$

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

$f''(x) = -\frac{1}{4}(1+x)^{-3/2}$ $\quad f''(0) = -\frac{1}{4}$

$f'''(x) = \frac{3}{8}(1+x)^{-5/2}$ $\quad f'''(0) = \frac{3}{8}$

formula

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

$$1 + \frac{1}{2}x - \frac{1x^2}{2!(4)} + \frac{3x^3}{8 \cdot 3!}$$

$$\boxed{1 + \frac{1}{2}x - \frac{x^2}{8} + \frac{x^3}{16}}$$

Great

2. Find the first 4 terms of the Taylor series for $g(x) = \sin x$ about the point $x = -\pi/4$.

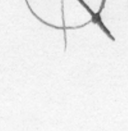
$g(x) = \sin x$	$g'(-\pi/4) = -\sqrt{2}/2$
$g'(x) = \cos x$	$g''(-\pi/4) = \sqrt{2}/2$
$g''(x) = -\sin x$	$g''(\pi/4) = \sqrt{2}/2$
$g'''(x) = -\cos x$	$g'''(\pi/4) = -\sqrt{2}/2$
$g''''(x) = \sin x$	$g^4(-\pi/4) = -\sqrt{2}/2$

formula: $f(a) + f'(a)(x-a) + \frac{f''(a)(x-a)^2}{2!} \ldots$

$$-\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}(x + \pi/4) + \frac{\sqrt{2}(x+\pi/4)^2}{2 \cdot 2!} + \frac{\sqrt{2}(x+\pi/4)^3}{2 \cdot 3!}$$

$$\boxed{-\frac{\sqrt{2}}{2} + \frac{\sqrt{2}(x+\pi/4)}{2} + \frac{\sqrt{2}(x+\pi/4)^2}{4} + \frac{\sqrt{2}(x+\pi/4)^3}{12}}$$

Excellent!



$\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}$

* The reason this is positive is b/c we had a NEG. π/4

Yes!