Simon Silverstein

I have read and agree to the exam policies. I promise not to cheat on this exam.

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2. $f(x) = \ln(x)$ — $x = 0$, $1 + 0 = 1$, $\ln(1) = 0$

$f'(x) = \frac{1}{x} = x^{-1}$ — $(1)^{-1} = 1$

$f''(x) = -x^{-2}$ — $-(1)^{-2} = -1$ ...

$f'''(x) = 2x^{-3}$ — $2(1)^{-3} = 2$

$f^{(4)}(x) = -6x^{-4}$ — $-6(1)^{-4} = -6$

$f(0) + f'(0)x + \frac{f''(0)}{2!}x^2 + \frac{f'''(0)}{3!}x^3 + \frac{f^{(4)}(0)}{4!}$

$0 + (1)x + \frac{(-1)}{2!}x^2 + \frac{(2)}{3!}x^3 + \frac{(-6)}{4!}x^4$

$$P_4 = x - \frac{x^2}{2!} + \frac{x^3}{3} - \frac{6x^4}{4!}$$

3. $\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!}$

$x = 3t$

$\sin(3t) = 3t - \frac{9t^3}{3!} + \frac{(3t)^5}{5!} - \frac{(3t)^7}{7!}$ ...

multiply each term by t

$$t\sin(3t) = 3t^2 - \frac{9t^4}{3!} + \frac{(3)^5 t^6}{5!} - \frac{(3)^7 t^8}{7!}$$