PRINT your name:

Answer each question below completely. You must fully justify your answers to get credit. Even a correct answer with no justification is wrong.

1. Write the Taylor series for e^x centered at $x = 2$. It might be useful to realize that $e^2 \cdot e^{x-2} = e^x$.

RECALL THAT THE MACLAURIN SERIES IS $e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!} = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots$

SO SUBSTITUTING, WE GET

$$e^x = e^2 e^{x-2} = e^2 \sum_{n=0}^{\infty} \frac{(x-2)^n}{n!} = e^2 + e^2(x-2) + \frac{e^2}{2!}(x-2)^2 + \frac{e^2}{3!}(x-2)^3 + \cdots$$

2. Write the degree 3 Taylor polynomial for $2x^2 + e^x$ centered at $x = 2$. Note that while doing the first question helps, this can be done even if you couldn't do part 1.

$f(x) = 2x^2 + e^x$ $\quad f(2) = 8 + e^2$ $\quad$ COEFFS

$f'(x) = 4x + e^x$ $\quad f'(2) = 8 + e^2$ $\quad 8 + e^2$

$f''(x) = 4 + e^x$ $\quad f''(2) = 4 + e^2$ $\quad \frac{4+e^2}{2}$

$f'''(x) = e^x$ $\quad f'''(2) = e^2$ $\quad \frac{e^2}{3!}$

SO THE DEGREE 3 TAYLOR POLYNOMAL FOR $2x^2 + e^x$ IS

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