Calculus II. S15 Quiz 8b Name Key Time

Show all work for full or partial credit. Put a box around your final answer in each part.

2. Find a power series which converges to the following functions, in the form $\sum_{n=k}^{\infty} a_n x^n$ where $k \geq 0$.

(a) $f(x) = \dfrac{x^3}{(1-x)^2}$

$$\boxed{\sum_{n=0}^{\infty} x^n = \frac{1}{1-x}}$$

$\frac{d}{dx}$

$$\Rightarrow \frac{1}{(1-x)^2} = \sum_{n=0}^{\infty} n x^{n-1}$$

$\cdot x^3$

$$\Rightarrow \frac{x^3}{(1-x)^2} = \sum_{n=0}^{\infty} n x^3 x^{n-1} = \sum_{n=0}^{\infty} n x^{n+2} = \sum_{n=0} (n+1) x^{n+3}$$

$$= \boxed{\sum_{n=2}^{\infty} (n-2) x^n}$$

OR $\boxed{\sum_{n=3}^{\infty} (n-2) x^n}$

(b) $f(x) = e^{2x}$

$$e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!}$$

$$\Rightarrow e^{2x} = \sum_{n=0}^{\infty} \frac{(2x)^n}{n!}$$

$$= \boxed{\sum_{n=0}^{\infty} \frac{2^n x^n}{n!}}$$