Name: Key

Quiz No. 7
Sections 1202,1203
3/28/19

1. (5 pts.) Find the Maclaurin series for $f(x)$ and the associated radius of convergence.

$$f(x) = 2e^{6x}$$

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

$$2e^{6x} = \boxed{2\sum_{n=0}^{\infty} \frac{(6x)^n}{n!}}$$

$$\lim_{n\to\infty} \left| \frac{(6x)^{n+1}}{(n+1)!} \cdot \frac{n!}{(6x)^n} \right| = \lim_{n\to\infty} \left| \frac{6x}{n+1} \right| = 0$$

$$\boxed{R = \infty}$$

2. (5 pts.) Find the Taylor series for $f(x) = x^4 - 2x$ centered at $a = -1$.

$f(x) = x^4 - 2x$ $\quad f(a) = 3$

$f'(x) = 4x^3 - 2$ $\quad f'(a) = -6$

$f''(x) = 12x^2$ $\quad f''(a) = 12$

$f'''(x) = 24x$ $\quad f'''(a) = -24$

$f^{(4)}(x) = 24$ $\quad f^{(4)}(a) = 24$

$f^{(5)}(x) = 0$ $\quad f^{(5)}(a) = 0$

$$x^4 - 2x = 3 - 6(x+1) + \frac{12(x+1)^2}{2} - \frac{24(x+1)^3}{6} + \frac{24(x+1)^4}{24}$$

$$\boxed{= 3 - 6(x+1) + 6(x+1)^2 - 4(x+1)^3 + (x+1)^4}$$