

Written homework #3

Please **show all your work**. Submit on April 17 in class.

1. Does this series converge? Show all the necessary work.

$$\sum_{n=1}^{\infty} \frac{n!(n+1)!(n+2)!}{(3n+1)!}$$

2. Find the radius of convergence and the convergence interval of the series

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

3. Construct the 5-th order Taylor polynomial for function $f(x) = \cos(2x)$ about $x = \frac{\pi}{2}$.

4. (a) Find first five non-zero terms of the Taylor series for $f(x) = \frac{1}{1+x^2}$ about $x = 0$.

- (b) Find first four non-zero terms of the Taylor series for $f(x) = \frac{x}{(1+x^2)^2}$ about $x = 0$.

Hint: this function is related to the derivative of the function from part (a).