

MAT 301  
Homework # 4  
Due: Friday, October 20th, 2017

*Directions: Write careful solutions to each of the following problems on separate sheets of paper. (You may put more than one solution on the same sheet of paper, if you have enough room). Be sure to show all of your work. You are allowed to talk to your classmates about these problems. If you do receive help from a classmate, be sure to give them credit by noting their name on your solution. All solutions should be written in your own words, regardless of if you've received help. Partial credit is available. Each problem is worth five points.*

1. Find the interval of convergence for each of the following power series:

(a)  $\sum_{n=0}^{\infty} \left(\frac{x+1}{6}\right)^n$

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

2. Let  $f(x) = \frac{2}{3x-4}$ .

(a) Find a power series for  $f$  centered at  $c = 0$ .

(b) Find the radius of convergence for the power series you found in part (a).

(c) Find a power series for  $f$  centered at  $c = 1$ .

(d) Find the radius of convergence for the power series you found in part (b).

(e) Find the domain of the function  $f$ . How does this make sense with the answers you found in the previous parts of this problem?

3. Find an approximation of  $e^2$  using Taylor's Theorem and the third Taylor polynomial for the function  $f(x) = e^x$ , centered at  $c = 0$ . Then use Taylor's Theorem to find a bound for the error of the approximation. Finally, compare your approximation of  $e^2$  with the value of  $e^2$  that your calculator gives you.