

MA114 Summer 2018
Worksheet 13 – Power Series Part 1 – 7/03/18

1. (a) What do the terms *power series*, *radius of convergence*, and *interval of convergence* mean?

- (b) Find a formula for the coefficients c_k of the power series

$$\frac{1}{0!} + \frac{2}{1!}x + \frac{3}{2!}x^2 + \frac{4}{3!}x^3 + \dots$$

- (c) Find a formula for the coefficients c_n of the power series

$$1 + 2x + 3x^2 + 4x^3 + 5x^4 + \dots$$

- (d) For what values of x does the series $\sum_{n=1}^{\infty} 2(\cos(x))^{n-1}$ converge?

- (e) Suppose $\lim_{n \rightarrow \infty} \sqrt[n]{|c_n|} = c$ where $c \neq 0$. What is the radius of convergence of the power series $\sum_{n=0}^{\infty} c_n x^n$?

- (f) Consider the function $\frac{5}{1-x}$. Find a power series that is equal to $f(x)$ for every x such that $|x| < 1$.

2. Find the radius and interval of convergence for each power series. Remember to check the endpoints.

(a) $\sum_{n=0}^{\infty} (5x)^n$

$$(b) \sum_{n=0}^{\infty} \frac{(-1)^n n}{4^n} (x-3)^n$$

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

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

$$(e) \sum_{n=0}^{\infty} n!(x-1)^n$$