

Math 4230 Assignment 7, due Wednesday, March 30th.

- (1) Compute the sum of the following series (include your calculations/explanation):

(a)
$$\sum_{n=0}^{\infty} \left(\frac{1}{n+1} - \frac{1}{n+2} \right)$$

(b)
$$\sum_{n=0}^{\infty} \left(\frac{i}{4} \right)^{2n}$$

- (2) Does the series $\sum_{n=0}^{\infty} \frac{e^{in}}{3^n}$ converge or diverge? (One way to find out is to use the ratio test.)

- (3) Find a domain for each of the series below in which the series converges for z in that domain.

(a)
$$\sum_{n=0}^{\infty} \frac{(z+i)^n}{3^n}$$

(b)
$$\sum_{n=0}^{\infty} \frac{z^n}{(2n)!}$$

- (4) Show that the series $\sum_{n=0}^{\infty} \frac{z^n}{i^n}$ does not converge uniformly in the interior of the unit disk ($|z| < 1$).

- (5) Use theorem 6 from the text to compute the first three terms of the Taylor series (around $z = 0$) of $\frac{e^{2z}}{z-1}$.