

HOMEWORK 5, DUE TUESDAY, MARCH 29

Please turn in solutions for the following problems:

- (1) Determine whether each series converges or diverges:

(a)  $\sum_{n=1}^{\infty} \frac{n}{(2i)^n}$

(b)  $\sum_{n=1}^{\infty} e^{in}$

(c)  $\sum_{n=1}^{\infty} \frac{(1+3i)^n}{4^n}$

(d)  $\sum_{n=1}^{\infty} \frac{i^n}{\sqrt{n}}$

- (2) For each function, find the Taylor series expansion of the function centered at the specified point:

(a)  $f(z) = z \sin(z^2)$  centered at  $z = 0$

(b)  $f(z) = \frac{1}{1-z}$  centered at  $z = i$

- (3) For each function, find the Laurent series expansion of the function on the specified domain:

(a)  $f(z) = \frac{e^z - 1}{z^2}$  on the domain  $|z| > 0$

(b)  $f(z) = \frac{\sin(z)}{z^3}$  on the domain  $|z| > 0$

(c)  $f(z) = \frac{z+1}{z-1}$  on the domain  $|z| > 1$

(d)  $f(z) = e^{1/z^2}$  on the domain  $|z| > 0$