

## Homework 8

1. Use a suitable convergence test to determine whether the given series converges or diverges.

(a)  $\sum \frac{\ln n}{n^2+1}$

(b)  $\sum \frac{1}{n \ln n}$

(c)  $\sum \frac{n!}{(2n-1)!}$

(d)  $\sum \frac{(-1)^n}{\sqrt{n^2+1}}$

(e)  $\sum \frac{n+2}{n\sqrt{n+1}}$

(f)  $\sum \frac{n^2+1}{3^n}$

(g)  $\sum (-1)^n n^{\sqrt{2}}$

(h)  $\sum \frac{(2n)^n}{n^{3n}}$

(i)  $\sum \frac{2^n n!}{(n+2)!}$

(j)  $\sum \frac{e^n+2^n}{3^n-2^n}$

2. Express in standard form  $a + bi$  the following complex numbers:

(a)  $(i + 1)(2i - 3)$

(b)  $(i^3 + i)(i + 1)$

(c)  $\frac{1+i}{2-3i}$

(d)  $\frac{(i+2)^2}{i+1}$

3. Find the eigenvalues and eigenvectors of the following matrices. Pick only linear independent eigenvectors.

(a)

$$\begin{bmatrix} 2 & -1 \\ 1 & 2 \end{bmatrix}$$

(b)

$$\begin{bmatrix} -2 & -2 & -9 \\ -1 & 1 & -3 \\ 1 & 1 & 4 \end{bmatrix}$$