

**Math 130, Section &E4, Fall 2001**  
**Exam 2, October 15**

SHOW ALL WORK TO QUALIFY FOR FULL CREDIT.  
MAXIMUM POSSIBLE SCORE: 100 POINTS

1. 30 pts points Determine whether the following series converge or diverge.
  - (a) 15 points  $\sum_{n=1}^{\infty} \sin \frac{1}{n^2}$
  - (b) 15 points  $\sum_{n=1}^{\infty} \frac{\ln n}{n^2}$
  
2. 40 points Find the interval of convergence of the following series.
  - (a) 20 points  $\sum_{n=1}^{\infty} \frac{(-2)^n}{\sqrt{n}}(x + 3)^n$ .
  - (b) 20 points  $\sum_{n=1}^{\infty} \frac{(2n)!}{(n!)^2} x^n$ . *Note: do NOT worry about the endpoints of the interval.*
  
3. 30 points Find a power series for the following functions.
  - (a) 15 points  $\frac{1}{x-2}$
  - (b) 10 points  $\frac{1}{(x-2)^2}$
  - (c) 5 points  $\int_0^x \frac{x^2}{(x-2)} dx$ .