

**MAT 319 HOMEWORK-6 DUE AT THE BEGINNING OF CLASS ON WEDNESDAY,  
OCTOBER 17**

One goal for this course is for you to develop your skill in effectively communicating mathematics. With this in mind, you should clearly write up your solutions. Solutions with little or no justification will receive little or no credit.

- (1) Carefully (re)-read sections 12 and 14 from the textbook.
- (2) Do problem 12.1. Explain, in a couple of sentences, how this finishes the proof of Theorem 12.2 in the textbook.
- (3) From section 12, do problems 12.3, 12.4, 12.5, and 12.6.
- (4) Determine which of the following series converge, and justify your answers.

(a)  $\sum_{n=1}^{\infty} \cos\left(\frac{\pi n}{4}\right)$

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

(c)  $\sum_{n=1}^{\infty} (-1)^n$

(d)  $\sum_{n=1}^{\infty} \frac{(-1)^n}{n!}$

- (5) Carefully explain why the ratio test does not help you determine whether the following series converge:

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

(b)  $\sum_{n=1}^{\infty} \frac{n-1}{n^2}$

- (6) For each of the two series from the last problem, write whether you believe it converges or diverges, and write the reason why. (I am asking for your ideas, not for a proof.)