# Homework Hints, Section 11.7

3. Test for Divergence

5. Use the Ratio Test, get limit of 2/5.

8. First, we might simplify:

$$\sum_{k=1}^{\infty} \frac{2^k k!}{(k+2)!} = \sum_{k=1}^{\infty} \frac{2^k}{(k+1)(k+2)}$$

   Now, use the Ratio Test:

$$\lim_{k\to\infty} \frac{|a_{k+1}|}{|a_k|} = \lim_{k\to\infty} \frac{2^{k+1}}{(k+2)(k+3)} \cdot \frac{(k+1)(k+2)}{2^k} = \lim_{k\to\infty} \frac{(k+1)}{(k+3)} 2 = 2 > 1$$

   Therefore, the series diverges.

11. The sum of two convergent series is a convergent series.

13. Using the Ratio Test, you should get a limit of 0.

15. Using the Root Test, you should get a limit of 0.

19. First, notice that the series does not converge absolutely. That is, by the comparison test, we have

$$\frac{\ln(n)}{\sqrt{n}} > \frac{1}{\sqrt{n}} \qquad n > 1$$

   And $\sum 1/\sqrt{n}$ is a divergent $p-$series. Use the Alternating Series Test to show conditional convergence (take the derivative to show the terms decrease).

21. Test for Divergence

25. Use the Ratio Test, get a limit of 0.