Name: _____

Write all of your responses on the extra paper provided. Put your name at the top of all the pages. Show all your work, answers without supporting justification will not receive credit.

1. (*10 Points*) Determine if the following sequence converges or diverges. If it converges, find the value it converges to and if it diverges show why.

$$\left\{e^{2n/(n+2)}\right\}_{n=1}^{\infty}$$

2. (*15 Points*) Determine if the following series converges or diverges. If it converges, find the value it converges to and if it diverges show why.

$$\sum_{n=1}^{\infty}\left(\frac{1}{e^n}+\frac{1}{n(n+1)}\right)$$

3. (*15 Points*) Use the integral test to determine if the following series converges or diverges.

$$\sum_{n=1}^{\infty} ne^{-n}$$

4. (*10 Points*) Use comparison or limit comparison to determine if the following series converges or diverges.

$$\sum_{n=1}^{\infty}\frac{n\sin^2(n)}{1+n^3}$$

5. **Extra Credit** (*5 Points*) Show that the following sequence converges and find the limit of the sequence.

$$\left\{\sqrt{2},\sqrt{2+\sqrt{2}},\sqrt{2+\sqrt{2+\sqrt{2}}},\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2}}}},\ldots\right\}$$