MATH 230
11.4

Directions: Show all work on a separate sheet of paper for full credit.

1. Suppose that $\sum a_n$ and $\sum b_n$ are series with positive terms and $\sum b_n$ is convergent.
   (a) If $a_n > b_n$ for all n, what can you say about $\sum a_n$? Why? Can not be determined.
   (b) If $a_n < b_n$ for all n, what can you say about $\sum a_n$? Why? $\sum a_n$ converges.
2. Suppose that $\sum a_n$ and $\sum b_n$ are series with positive terms and $\sum b_n$ is divergent.
   (a) If $a_n > b_n$ for all n, what can you say about $\sum a_n$? Why? $\sum a_n$ diverges.
   (b) If $a_n < b_n$ for all n, what can you say about $\sum a_n$? Why? Can not be determined
3. Determine whether the series converges or diverges.
   (a) $\sum_{n=1}^{\infty} \frac{1}{n^3+8}$ Convergent. DCT with $\sum \frac{1}{n^3}$
   (b) $\sum_{n=2}^{\infty} \frac{1}{\sqrt{n}-1}$ Divergent. DCT with $\sum \frac{1}{n^{1/2}}$
   (c) $\sum_{n=1}^{\infty} \frac{6^n}{5^n-1}$ Divergent. DCT with $\sum \frac{6^n}{5^n}$
   (d) $\sum_{n=1}^{\infty} \frac{9^n}{3+10^n}$ Convergent. DCT with $\sum \frac{9^n}{10^n} = \sum \left(\frac{9}{10}\right)^n$
   (e) $\sum_{k=1}^{\infty} \frac{\ln(k)}{k}$ Divergent. DCT with $\sum \frac{1}{k}$ or IT
   (f) $\sum_{n=1}^{\infty} \frac{n\sin^2(n)}{1+n^3}$ Convergent. DCT with $\sum \frac{1}{n^2}$
   (g) $\sum_{n=1}^{\infty} \frac{n+1}{n^3+n}$ Convergent. LCT with $\sum \frac{1}{n^2}$
   (h) $\sum_{n=2}^{\infty} \frac{1}{n\sqrt{n^2-1}}$ Covergent. LCT with $\sum \frac{1}{n^2}$
   (i) $\sum_{n=1}^{\infty} \frac{n+3^n}{n+2^n}$ Divergent. LCT with $\sum \frac{3^n}{2^n} = \sum \left(\frac{3}{2}\right)^n$
   (j) $\sum_{n=1}^{\infty} \frac{e^n+1}{ne^n+1}$ Divergent. LCT with $\sum \frac{1}{n}$
   (k) $\sum_{n=1}^{\infty} \frac{1}{n^n}$ Converges. DCT with $\sum \frac{1}{n^2}$
   (l) $\sum_{n=1}^{\infty} \frac{5+2n}{(1+n^2)^2}$ Coverges. LCT with $\sum \frac{1}{n^3}$