Homework 02

1. Section 10.1: Problems 46, 53, 59, 63, 67, 69, 73, 81, 87, 89.

   Hint for problem 73: Read Appendix A.5, "Limit 6".

   Hint for problem 87: Multiply by $\dfrac{n+\sqrt{n^2-n}}{n+\sqrt{n^2-n}}$.

   Hint for problem 89: Use Theorem 4 and Fundamental Theorem of Calculus + L'Hôpital's Rule.

2. Section 10.2: Problems 31, 33, 43, 61, 63, 65, 71, 78.

3. Section 10.3: Problems 7, 27, 28, 31, 33, 37, 41, 51, 55.

   Hint for problem 41: If both $\sum a_n$ and $\sum b_n$ diverge, then $\sum(a_n \pm b_n)$ could either converge or diverge in general.

   To determine the convergence or divergence, one can, for example, simplify $a_n = \dfrac{a}{n+2} - \dfrac{1}{n+4} = \dfrac{\cdots}{(n+2)(n+4)}$ and use one of the comparison methods in Section 10.4.

   Hint for problem 51: Use "Bounds for the Remainder in the Integral Test" on page 611.

   Homework for next week (Homework 03):

4. Section 10.4: Problems 15, 16, 17, 27, 29, 31, 43, 45, 51, 61, 62.

   Hints for problem 61:

   (a) For simplicity, just take a fixed case $p = 1.5$, $q = 3$ and proceed. The same argument works for all $p > 1$, $q > 0$. The case $p > 1$, $q \le 0$ is easier (Why?).

   (b) Instead of evaluating $\lim_{n\to\infty} \dfrac{(\ln n)^3}{n^{1.5-1.25}}$, it is and easier to evaluate $\left(\lim_{n\to\infty} \dfrac{\ln n}{n^{\frac{1.5-1.25}{3}}}\right)^3$.

   Hint for problem 62:

   For simplicity, just take a fixed case $p = 0.5$, $q = -2$ and proceed. The same argument works for all $0 < p < 1$, $q < 0$. The case $0 < p < 1$, $q \ge 0$ is easier.