Mathematics 242 – Principles of Analysis
Problem Set 5, *Due:* 10/14

I. Decide whether or not each of the following infinite series converges, and justify your claim using one of the results in sections 2.4 and 2.7 of Abbott:

A)

$$\sum_{n=0}^{\infty} \frac{1}{\sqrt{2n+1}}$$

B)

$$\sum_{n=0}^{\infty} \frac{1}{(2n+1)^2}$$

C)

$$\sum_{n=0}^{\infty} (-1)^n \frac{2^n}{3^{2n}}$$

D)

$$\sum_{n=0}^{\infty} (-1)^n \frac{n^3+n}{2n^3+n+1}$$

II.
A) For which $x \in [0, 2\pi]$ does the series

$$\sum_{n=1}^{\infty} \sin^n(x)$$

converge? What is the sum for those x?
B) For which $x \in \mathbf{R}$ does the series

$$\sum_{n=1}^{\infty} e^{nx}$$

converge? What is the sum for those x?

III. From Abbott: 2.7.3, 2.7.4, 2.7.9.

IV. Use the Ratio Test (Exercise 2.7.9 above) to determine for which $x \in \mathbf{R}$ the series

$$\sum_{n=0}^{\infty} \frac{(x-1)^n}{3^n}$$

converges. (Hint: The Ratio Test will give an open interval of values of x on which the series converges absolutely. What happens at the endpoints of that interval?)