Name: _____   **TA's Name:** _____

Instructions: You must show supporting work to receive full and partial credits. No text book, notes, formula sheets allowed.

1(20pts) Find the following for the power series: (a) center and radius of convergence; (b) interval of absolute convergence; (c) points of conditional convergence if any, (d) interval of convergence; (e) intervals of divergence,

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

2(10pts) A rectangular swimming pool 50 ft long, 20 ft wide, and 10 ft deep is filled with water to a depth of 9 ft. Set up an integral to find the work required to pump all of it over the top rim. (The weight density of water is 62.4 lb per ft^3.)

3(10pts) (a) Find the Taylor polynomial $P_3(x)$ of of $f(x) = \ln x$ at point $x = a = 1$.

(b) Compare the values of $\ln(1.1)$ and $P_3(1.1)$ by stating the decimal place to which these two values agree.

4(10pts) (a) Use the Integral Test to determine the value of p such that $\displaystyle\sum_{n=2}^{\infty} \frac{1}{n(\ln n)^p}$ converges.

5(20pts) Determine if the following series converge.

(a) $\displaystyle\sum_{n=1}^{\infty} \cos\left(\frac{1}{n}\right)$

(b) $\displaystyle\sum_{n=0}^{\infty} \frac{2^n n!}{(2n)!}$

6(20pts) Use comparison tests to determine if the following series converge absolutely or diverges:

(a) $\displaystyle\sum_{n=0}^{\infty} \frac{2^n \sin n}{3^n + 2}$

(b) $\displaystyle\sum_{n=1}^{\infty} \frac{n+1}{\sqrt{n(n^2 + 1)}}$

7(10pts) If you use the first 9 terms of the series $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n^2}$ to approximate it, how many decimal place accuracy do you expect to get for the approximation? Explain your work.

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2 Bonus Points: True or False: There are 12 schools in the Big XII Conference. _____ (... *The End*)