

Test 3 Review

Dr. Graham-Squire, Spring 2012

- The test will cover sections 6.6 (tanks) and 8.1-8.5.
- To study, you should look over your notes, labs, rework HW problems, quizzes, and problems from the notes, as well as work out the practice problems given for each section. The Review Questions at the end of Chapter 8 will also be good practice (True/False (page 629) #1-9, Exercises # 1-34).
- Calculators can be used on this test, but will not be necessary.
- Some practice problems to work on:

1. A tank has the shape of an inverted circular cone with height 10 meters and base radius 4 meters. It is filled with water to a height of 8 meters. Note: The density of water is 1000 kg/cubic meter, and gravity is 9.8 m/sec^2

(a) Find the work required to empty the tank by pumping all of the water to the top of the tank.

(b) Find the work required to pump the water to a point that is 6 meters above the top of the tank.

2. Determine whether the sequence is convergent or divergent. If convergent, find the limit.

(a) $a_n = \frac{n^3 + n^2 \cos n}{n^3}$

(b) $b_n = \frac{\sqrt[3]{n}}{\ln n}$

3. Determine if the series is convergent or divergent. If it is convergent, find the limit. Make sure you state which convergence/divergence test you use (or if no test, then explain your reasoning).

(a) $\sum_{n=1}^{\infty} \frac{3^n}{5^{n+2}}$

(b) $\sum_{n=1}^{\infty} \frac{2}{n(n+2)}$ Note: You may need to use a partial fraction decomposition.

(c) $\sum_{n=1}^{\infty} \frac{3n^2 + 8}{(10n + 1)^2}$

4. Test the series for convergence or divergence. If it converges, state whether it is absolutely convergent or not.

(a) $\sum_{n=2}^{\infty} \frac{(-5)^n - 7}{4^n}$

(b) $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{\sqrt[3]{n^4} + 10}{n^2}$

(c) $\sum_{n=1}^{\infty} (-1)^n \frac{n^4}{3^n}$

5. (a) Find the sum of $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^4}$ correct to five decimal places. (b) How would you find the approximation if it was a 1 in the numerator instead of $(-1)^{n+1}$ (That is, how would you figure out how many terms you need to add up)?

6. Find the radius of convergence and interval of convergence of the series $\sum_{n=1}^{\infty} \frac{(x+2)^n}{n(4^n)}$