Group Project Worksheet II
Math 21-123
Due during your office meet

Group Members: _____

Time Spent: _____

1. Describe each of the following tests stating each and every condition.

(a) Geometric series test

(b) Divergence test

(c) Integral Test

(d) Limit Comparison Test

(e) Comparison test

(f) Ratio Test

(g) Root Test

(h) Alternating Series Test

2. Mark True or False. Give the reason for your choice.

(a) The series $\sum a_n$ converges if $\lim_{n \to \infty} a_n = 0$.

(b) Ratio test can used to test the convergence of $\sum \frac{5}{6n^3 + 2n^2 + 5n + 1}$.

(c) If $\sum |a_n|$ converges then so does $\sum a_n$.

(d) Comparison test says that if $a_n \geq b_n$ and $\sum b_n$ converges then so does $\sum a_n$.

(e) If $\lim a_n = e$ then $\sum a_n$ converges and the sum is equal to e.

(f) The series $\sum \frac{(-1)^{n-1}}{\sqrt{n}}$ converges absolutely.

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(g) Root test can used to test the convergence of $\sum \frac{(-1)^{n-1}}{\sqrt{n}}$.

(h) It is possible to use the Root test to claim that the series $\sum a_n$ converges conditionally.

(i) We can use telescoping series method to test the convergence or the divergence of the series $\sum (\ln(k-1) - \ln(k+1))^k$.

(j) If $\lim a_n \neq 0$ then $\sum (-1)^n a_n$ diverges.

(k) If $\lim a_n = 0$ but a_n's fail to decrease then $\sum (-1)^n a_n$ diverges.

3. Write the names of all the tests that you can use to test the convergence or divergence of the following series and show all your work that justifies the reason for your choice of the tests. Also, mention if the series converges or diverges.

(a) $\sum_{n=2}^{\infty} \frac{1}{n \ln n}$

(b) $\sum_{n=1}^{\infty} (1 - \cos(1/n))$

(c) $\sum \frac{\cos^2(n\pi)}{n^2}$

(d) $\sum \sin(\frac{1}{n})$

(e) $\sum \frac{2 - \sin n\pi}{n}$

(f) $\sum (-1)^{n-1} \frac{3^n}{n^3}$

(g) $\sum \frac{\sin 4n}{4^n}$

(h) $\sum (2\ln(k^2 - 1) - \ln(k^2 + 1))^k$

(i) $\sum \frac{(-1)^{n+1} 5^{n-1}}{(n+1)^2 4^{n+2}}$

(j) $\sum (-1)^k \frac{k!}{k^k}$

4. What do you mean by absolutely convergent series and conditionally convergent series. Give TWO examples of each.

5. You visit the Grand Canyon and drop a penny off the edge of a cliff. Suppose the distance the penny will fall is 4 feet the first second, 8 feet the next second, 16 feet the third second, and so on. Assuming this pattern continues, find the total distance the penny will fall in one minute?