Homework 7 2/25: MATH 112-1 Prof. Maxwell Auerbach

Show all work. No credit will be given for answers without sufficient work. No calculators are allowed. Collaboration with classmates is allowed, but all work submitted must be written out and explained by you.

1 Homework 7 Problems: Alternating Series

1.1 Find whether the following alternating series converges or diverges

1.1 a) (11.5.6) $\sum_{n=1}^{\infty}(-1)^{n+1}\frac{1}{\sqrt{n+1}}$

1.1 b) (11.5.12) $\sum_{n=1}^{\infty}(-1)^{n+1}ne^{-n}$

1.1 c) (11.5.16) $\sum_{n=1}^{\infty}(-1)^{n+1}\frac{n\cos(n\pi)}{2^n}$

1.1 d) (11.5.4) $\frac{1}{\ln(3)}-\frac{1}{\ln(4)}+\frac{1}{\ln(5)}-\frac{1}{\ln(6)}+\frac{1}{\ln(7)}-\cdots$

1.1 e) (11.5.18) $\sum_{n=1}^{\infty}(-1)^{n}\cos\left(\frac{\pi}{n}\right)$

1.1 f) (11.5.8) $\sum_{n=1}^{\infty}(-1)^{n}\frac{n^2}{n^2+n+1}$

1.1 g) (11.5.17) $\sum_{n=1}^{\infty}(-1)^{n}\sin\left(\frac{\pi}{n}\right)$

1.1 h) (11.5.3) $-\frac{2}{5}+\frac{4}{6}-\frac{6}{7}+\frac{8}{8}-\frac{10}{9}+\cdots$

2 Homework 7 Problems: Absolutely Convergent Series

2.1 Find whether the following series converges or diverges using any method.

2.1 a) (11.6.38) $\sum_{n=2}^{\infty}\frac{(-1)^n}{n\ln n}$

2.1 b) (11.6.33) $\sum_{n=1}^{\infty}\frac{(-9)^n}{n10^{n+1}}$

Extra Problems 2/25: MATH 112-1 Prof. Maxwell Auerbach

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3 Extra Problems: Alternating Series and Absolutely Convergent Series

3.1 Find whether the following series converges or diverges using any method that is valid.

3.1 a) (11.7.18) $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{\sqrt{n}-1}$

3.1 b) (original) $\sum_{n=1}^{\infty} \frac{(-1)^n 5^n}{6^n}$

3.1 c) (11.7.26) $\sum_{n=1}^{\infty} \frac{n^2+1}{5^n}$

3.1 d) (11.7.14) $\sum_{n=1}^{\infty} \frac{\sin(2n)}{1+2^n}$

3.1 e) (11.7.19) $\sum_{n=1}^{\infty} (-1)^n \frac{\ln(n)}{n}$

3.1 f) (11.7.3) $\sum_{n=1}^{\infty} (-1)^n \frac{n^2-1}{n^3+1}$

3.1 g) (original) $\sum_{n=1}^{\infty} \frac{\cos(n)(n-3)^2}{(n^2+1)^2}$

3.1 h) (11.7.31) $\sum_{n=1}^{\infty} \frac{5^k}{3^k+4^k}$

3.2 (original) Show that the series is convergent. How many terms of the series do we need to add in order to find the sum to the indicated accuracy?

3.1 a) $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^2-1}$ $(|\text{error}| < 0.002)$

3.1 b) $\sum_{n=1}^{\infty} \frac{(-1)^n 2^n}{6^n+4^n}$ $(|\text{error}| < 0.00001)$

3.1 c) $\sum_{n=1}^{\infty} \frac{\cos(35n)}{n^3}$ $(|\text{error}| < 0.004)$

3.3 Seraphina's Uncle promises to deposit $\$40(2)^{-n}$ every odd day and withdraw $\$40(2)^{-n}$ every even day from an account. How long should Seraphina wait to withdraw from the account so that she misses out on less than \$0.01 possible dollars.