

Math 122
Quiz 7 Review

Determine if the following sequences converge or diverge, If it converges, find the limit:

1. $\left\{ \frac{2n-1}{3n^2+1} \right\}_{n=1}^{\infty}$

2. $\left\{ \frac{-9 + (-1)^n}{n!} \right\}_{n=1}^{\infty}$

3. $\left\{ \left(\frac{n+1}{n} \right)^n \right\}_{n=1}^{\infty}$

4. $\left\{ \frac{2n - \sqrt{n}}{n} \right\}_{n=1}^{\infty}$

Determine if the following series converge or diverge, and if it converges, find the sum:

5. $\sum_{n=0}^{\infty} 2 \left(\frac{-1}{2} \right)^n$

6. $\sum_{n=0}^{\infty} \frac{1}{3^n}$

7. $\sum_{n=1}^{\infty} 2(-0.9)^n$

8. $\sum_{n=1}^{\infty} \frac{n-6}{n}$

9. $\sum_{n=1}^{\infty} \frac{1}{1+e^{-n}}$

10. $\sum_{n=0}^{\infty} 0.5 \left(-\frac{4}{3} \right)^n$

11. $\sum_{n=0}^{\infty} \left(\frac{\sqrt{5}}{1+\sqrt{5}} \right)^n$

12. $\sum_{n=1}^{\infty} \left(\frac{1}{n} - \frac{1}{n+2} \right)$

13. $\sum_{n=1}^{\infty} \frac{1}{n^2 + 4n + 3}$

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

15. Use the fact that $\sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{\pi^2}{6}$ to find

$$\sum_{n=3}^{\infty} \frac{1}{n^2}$$

Answers

1. 0

2. 0

3. e

4. $\lim_{n \rightarrow \infty} \frac{2n - \sqrt{n}}{n} = 2$

5. $\frac{4}{3}$

6. $\frac{3}{2}$

7. $-\frac{18}{19}$

8. Diverges

9. Diverges

10. Diverges

11. Converges $1 + \sqrt{5}$

12. $\sum_{n=1}^{\infty} \left(\frac{1}{n} - \frac{1}{n+2} \right) = \left(1 - \frac{1}{3} \right) + \left(\frac{1}{2} - \frac{1}{4} \right) + \left(\frac{1}{3} - \frac{1}{5} \right) + \left(\frac{1}{4} - \frac{1}{6} \right) \dots = \frac{3}{2}$

13. $\frac{5}{12}$

14. $\frac{3}{4}$

15. $\sum_{n=3}^{\infty} \frac{1}{n^2} = \frac{\pi^2}{6} - \left(1 + \frac{1}{4} \right)$