

Mathematics 222 Assignment 1

1. Does the sequence $b_n = \sin(\frac{\pi}{2} + \frac{1}{n})$ converge or diverge? If it converges, what is the limit?
2. Does the sequence $b_n = n\pi \cos(n\pi)$ converge or diverge? If it converges, find the limit.
3. Does the sequence $b_n = n^2(1 - \cos(\frac{1}{n}))$ converge or diverge? If it converges, what is the limit?

4. Does the sequence

$$b_n = \frac{1}{\sqrt{n^2 - 1} - \sqrt{n^2 + n}}$$

converge or diverge? If it converges, find the limit.

5. Test the following series for convergence (absolute or conditional) or divergence justifying your answer

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

6. Test the following series for convergence (absolute or conditional) or divergence

$$\sum (-1)^{n+1} \frac{(n!)^2}{(2n)!}$$

7. Test the following series for convergence (absolute or conditional) or divergence

$$\sum \frac{(-1)^n}{\sqrt{n+1} + \sqrt{n}}$$

8. Test the following series for convergence (absolute or conditional) or divergence

$$\sum \frac{1}{n\sqrt{\ln(1+n)}}$$

9. Test the following series for convergence (absolute or conditional) or divergence

$$\sum \frac{\sin n}{(n^2 + 1)} \sqrt{n}$$

10. Test the following series for convergence (absolute or conditional) or divergence

$$\sum \frac{(-1)^n}{(1 + 1/n)^{n^2}}$$

11. Test the following series for convergence (absolute or conditional) or divergence

$$\sum (-1)^n \frac{\sin 1/n}{(\ln(1+n))^2}$$