# Math 152 - Week-in-Review 8

**Sinjini Sengupta**

Do the following series converge or diverge?
Which test should be used to demostrate convergence or divergence?

1. $\displaystyle\sum_{n=0}^{\infty} \frac{1}{1+n^2}$.

2. $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n+2^n}$.

3. $\displaystyle\sum_{n=1}^{\infty} 7\sin\left(\frac{\pi}{n}\right)$.

4. $\displaystyle\sum_{n=1}^{\infty} \frac{1}{2^{(1/n)}}$.

5. $\displaystyle\sum_{n=1}^{\infty} \frac{5^n}{1+7^n}$.

6. $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n n^2}{n^2+5n+1}$.

7. $\displaystyle\sum_{n=1}^{\infty} \frac{(2n)!}{(n!)^2}$.

8. $\displaystyle\sum_{n=1}^{\infty} \frac{(-3)^n}{(2n+1)!}$.

9. $\displaystyle\sum_{n=1}^{\infty} (-1)^n \frac{2^n n!}{5 \cdot 8 \cdot 11 \cdot \cdots \cdot (3n+2)}$.

Do the following series converge absolutely, converge but not absolutely, or diverge?

10. $\displaystyle\sum_{n=1}^{\infty}(-1)^n\frac{n^2+1}{3^n}$.

11. $\displaystyle\sum_{n=1}^{\infty}\frac{(-1)^n}{n\ln(n)}$.

12. $\displaystyle\sum_{n=1}^{\infty} \frac{\cos(n\pi)}{3n+2}$.

13. $\displaystyle\sum_{n=1}^{\infty} (-1)^n \frac{n}{2n^2+3}$.

14. How many terms are required to approximate the sum of the series $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^4}$ so that the error is less than 0.001?

15. Approximate the sum of the series $\displaystyle\sum_{n=1}^{\infty} (-1)^n n e^{-2n}$ to within 4 decimal places.

Find the Radius and the Interval of Convergence for the following power series.

16. $\displaystyle\sum_{n=0}^{\infty} \frac{(x+2)^n}{2^n}$.

17. $\displaystyle\sum_{n=0}^{\infty} \frac{(2n)!(x-5)^n}{2n+1}$.

18. $\displaystyle\sum_{n=2}^{\infty} \frac{3^n(x-1)^n}{n\ln(n)}$.

19. $\displaystyle\sum_{n=0}^{\infty} \frac{2^n(x-3)^n}{n!}$.

20. If the power series given by $\sum_{n=0}^{\infty} C_n(x-2)^n$ coverges at $x = 5$ and diverges at $x = -4$, what can we say about the following?

(a) $\sum_{n=0}^{\infty} C_n$

(b) $\sum_{n=0}^{\infty} C_n(-3)^n$

(c) $\sum_{n=0}^{\infty} C_n 9^n$

(d) $\sum_{n=0}^{\infty} C_n(-5)^n$

(e) $\sum_{n=0}^{\infty} C_n(-2)^n$

(f) $\sum_{n=0}^{\infty} C_n 4^n$