Definitions

convergent sequence:

convergent series:

alternating series:

absolutely convergent:

conditionally convergent:

radius of convergence:

interval of convergence:

Taylor Series:

Maclaurin Series:

Test	Hypotheses	Example of How to Use the Test
Divergence		
Integral		
Comparison		
Limit Comparison		
Alternating Series		
Ratio		
Root		

Series	Expansion	Convergence	Divergence
Geometric $\sum_{n=0}^{\infty} a r^{n-1}$	$a + ar + ar^2 + ar^3 + \dots$	$|r| < 1$	$|r| \geq 1$
p-series			
harmonic			
power			
alternating			
Taylor			
Maclaurin			
e^x			
$\sin x$			
$\cos x$			
$(1+x)^k$			

① Suppose $\sum a_n = 3$ and S_n is the nth partial sum of the series.

what is $\lim_{n\to\infty} a_n$?

what is $\lim_{n\to\infty} S_n$?

② Suppose $f(x)$ is the sum of a power series with radius of convergence R.

How do you differentiate $f(x)$?
What is the radius of convergence of $f'(x)$?

How do you integrate $f(x)$?
What is the radius of convergence of $\int f(x)\,dx$?

③ a) Write an expression for the nth degree Taylor polynomial of f centered at a.
b) Write an expression for the Taylor series of f centered at a.
c) Write an expression for the Maclaurin series of f.
d) How do you show that $f(x)$ is equal to the sum of the Taylor series?
e) State Taylor's Inequality

True / False

① If $0 \le a_n \le b_n$ and $\sum b_n$ diverges then $\sum a_n$ diverges

② If $\lim_{n\to\infty} a_n = 0$ then $\sum_{n=0}^{\infty} a_n$ is convergent.

③ If $\sum c_n 6^n$ is convergent then $\sum c_n (-6)^n$ is convergent

④ If $\lim_{n\to\infty} a_n = L$, then $\lim_{n\to\infty} a_{2n+1} = L$.

⑤ If $-1 < a < 1$, then $\lim_{n\to\infty} a^n = 0$

⑥ If $\{a_n\}$ and $\{b_n\}$ are divergent, then $\{a_n b_n\}$ is divergent.

⑦ If $a_n > 0$ and $\sum a_n$ converges, then $\sum (-1)^n a_n$ converges

$\boxed{\text{Problems}}$

Determine convergence or divergence

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

② $\displaystyle\sum_{n=1}^{\infty} \frac{n^3}{5^n}$

③ $\displaystyle\sum_{n=1}^{\infty} \frac{(-5)^{2n}}{n^2 9^n}$

④ $\displaystyle\sum_{n=1}^{\infty} (-1)^{n-1} \frac{\sqrt{n}}{n+1}$

⑤ $\displaystyle\sum_{n=1}^{\infty} (-1)^{n-1} n^{-1/3}$

⑥ $\displaystyle\sum \frac{n^{2n}}{(1+2n^2)^n}$