§12.5 #5 Conv / Div ?

$S = \sum \frac{(-1)^{n-1}}{2n+1}$ identify $b_n = \frac{1}{2n+1} > 0$

and note $b_{n+1} = \frac{1}{2(n+1)+1} < \frac{1}{2n+1} = b_n$ $\therefore$ b_n decreasing

and $b_n = \frac{1}{2n+1} \longrightarrow 0$ as $n \longrightarrow \infty$ $\therefore$ S converges by A.S.T.

§12.5 #7 Conv/Div ?

$\sum_{n=1}^{\infty} (-1)^n \frac{3n-1}{2n+1}$ diverges by n^{th} term test

since $\lim_{n\to\infty} (-1)^n \left(\frac{3n-1}{2n+1}\right)$ d.n.e.

§12.5 #12 Conv/Div ?

$S = \sum_{n=1}^{\infty} (-1)^{n-1} \frac{e^{1/n}}{n}$ identify $b_n = \frac{1}{n} e^{\frac{1}{n}} > 0$

and $b_{n+1} = \frac{1}{n+1} e^{\frac{1}{n+1}} < \frac{1}{n} e^{\frac{1}{n}}$

and $\lim_{n\to\infty} \left(\frac{e^{1/n}}{n}\right) = 0$ thus the A.S.T yields that S converges.

§12.5 #19

$\sum_{n=1}^{\infty} (-1)^n \frac{n^n}{n!}$ has $b_n = \frac{n^n}{n!} > 0$

but $n^n = n \cdot n \cdot n \cdot n \cdots n \geq n(n-1)(n-2)\cdots 3 \cdot 2 \cdot 1$

$\Rightarrow \frac{n^n}{n!} > 1$ for $n > 1$

$\therefore \lim_{n\to\infty} (-1)^n \frac{n^n}{n!} \neq 0$ $\therefore$ series diverges by n^{th} term test.

§12.5 #28

$S = \sum (-1)^n \frac{n}{8^n}$ is alternating

thus $|S - S_n| < \frac{n+1}{8^{n+1}} = 0.00001$ $\longrightarrow$ solve for n then calculate S_n for that choice.

— error in alternating series partial sum —