

H. W. 9

① calculate

$$1 + 7 + 13 + 19 + \dots + \del{599} 601$$

(Arithmetic series)

② calculate

$$6 + 6(\cdot 1) + 6(\cdot 1)^2 + 6(\cdot 1)^3 + \dots + 6(\cdot 1)^N \quad (*)$$

for $N=10$ and $N=100$.

What happens to $(*)$ when $N \rightarrow \infty$.

③ Show that the series

$$1 + \frac{1}{25} + \frac{1}{35} + \frac{1}{45} + \frac{1}{55} + \dots$$

converges and calculate an upper bound.

Using your calculator, approximate the above series up to 3 decimal places.

④ Argue using ratio test if the series

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

converges or diverges.

⑤ Argue if the following 2 series converges or diverges.

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

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

you can use any method in the world.

⑥ Expand the function

$$\frac{1}{1-x}$$

into power series when

① $|x| < 1$ ② $|x| > 1$

⑦ Calculate the Taylor series expansion of the function

$$e^x, \sin x, \cos x$$

at $x=0$.