## **Taylor Series**

## Practice problems

Expand all approximations to the first 5 nonzero terms.

- 1. What is the Taylor series approximation for any given polynomial function?
- 2. Find out the following Taylor approximations.
  - i)  $\sin x \, at \, x = \pi$
  - ii)  $e^x at x = 3$
- 3. Write down the Taylor approximations of the following functions at x=0.
  - i)  $\cos(2x)$
  - ii)  $e^{-x}$
  - iii)  $\sin(x^2)$
  - iv)  $xe^x$
- 4. Write down the Taylor approximations of the following functions at x=0.
  - i)  $\tan x$
  - ii)  $\sec x$
  - iii)  $\arcsin x$
- 5. Compute the analytic functions of which the following are the Taylor series at x=0.
  - i)  $1 + x + x^2 + x^3 + \dots + x^n$
  - ii)  $1 x + x^2 x^3 + \dots + (-1)^n x^n$
- 6. Integrate the given series in 5. i) and 5. ii). What do you expect to find?

Bonus:

- 7. Write down the Taylor approximations of the following functions at x=0.
  - i)  $\ln(\sin x)$
  - ii) sin(cos x)
- 8. Write down the Taylor approximations of the following functions at x=0.

i) 
$$\frac{e^x}{\cos x}$$

ii) 
$$\frac{\sin x}{e^x}$$