

25% 1. Let  $f(x) = x$ ,  $-1 < x < 1$ .

a. Find exponential series of  $f(x)$ .

b. Show 
$$\sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{\pi^2}{6}$$

25% 2. Find a solution of

$$\frac{d^2}{dx^2} G(x, x') + G(x, x') = \delta(x - x')$$

satisfying  $G(0, x') = G(a, x') = 0$ .

25% 3. Prove the angular momentum operator  $\vec{L}$  is a hermitian operator.

25% 4. Describe how computer solve <sup>the</sup> radial part of Schrödinger eq. for a hydrogen problem.