Quantum Computing vs Classical Computing
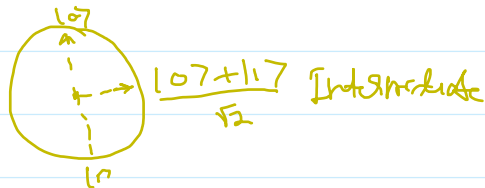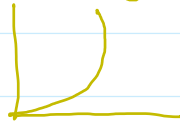
Quantum Computing

(1) Quantum bits or Qubits
 ⇒ Two-level quantum system
 ⇒ Represent $|0\rangle$ or $|1\rangle$ or
   linear combination $|0\rangle$ & $|1\rangle$

$$\frac{|0\rangle + |1\rangle}{\sqrt{2}} \text{ Intermediate}$$

(ii) Calculation power increases exponentially as no. of qubits increase

(iii) Hardware varies such as Superconducting qubits, ion traps, integrated photonics, NMR, Majorana Fermions

(iv) CPU – Process parallel

(v) Useful for optimization, data analysis & simulation

Classical Computing

(i) Classical bits – 0 & 1
 ⇒ Represent voltage levels
   – ON or OFF
   • 0
   • 1

(ii) Calculation power increases linearly with no. of transistor

(iii) Hardware made of CMOS circuit

(iv) CPU – process in sequential

(v) Everyday tasks