

Q1. Following data is obtained from sieve analysis of a sand sample.

Plot 'Aperture size(mm) vs Cumulative percentage retained(%)' data in linear graph, log graph. Since these are experimental data, produce scatter plot.

Aperture (mm)	B.S.S No.	Retained (%)	Cum (%)	Product
1.40	14	0.05	0.05	0.70
1.00	16	0.34	0.39	4.76
0.71	25	0.36	0.75	6.48
0.50	35	1.26	2.01	31.5
0.355	45	3.78	5.79	132.3
0.250	60	13.06	18.85	587.7
0.180	80	28.06	46.91	1683.6
0.125	120	39.76	86.07	3180.8
0.09	170	8.45	95.12	1014
0.068	230	1.72	96.84	292.4
		1.20	98.04	276
		98.04		7210.24

Q2. Simulate the following probabilistic problem using random package and visualize it's results by drawing a histogram.

A bag contains 20 marble of following details:

- Red Color = 4
- Black Color = 5
- White Color = 3
- Blue Color = 8

If a balls is randomly chosen from the bag what is the probability of various possible outcomes. Visualize this in histogram and also determine the probability of getting white marble.

Hint:

A bag can be simulated in python by making a list like this.

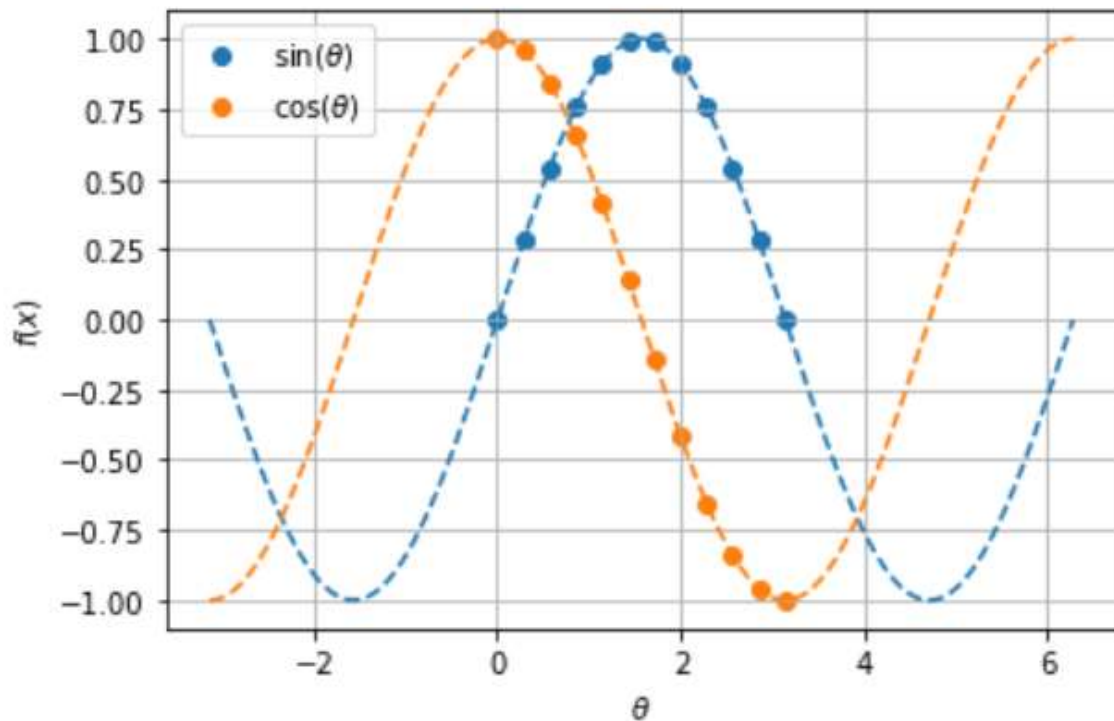
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R = 'Red'
K = 'Black'
W = 'White'
B = 'Blue'
```

```
bag = [R,R,R,R, K,K,K,K,K, W,W,W, B,B,B,B, B,B,B,B]
```

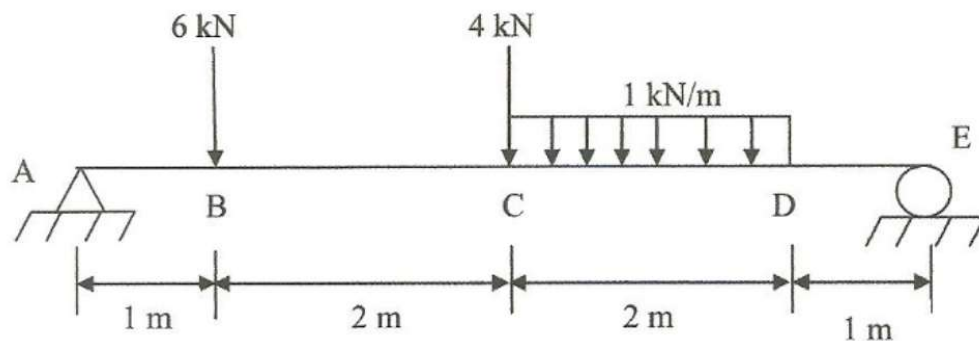
Q3: Curve Sketching

- Print the value of $\sin(x)$ and $\cos(x)$ for $0 \leq x \leq \pi$.
- Take step size of $\frac{\pi}{12}$.
- Plot functions $\sin(x)$ and $\cos(x)$ and plot points too.

Plot should be similar to this image.



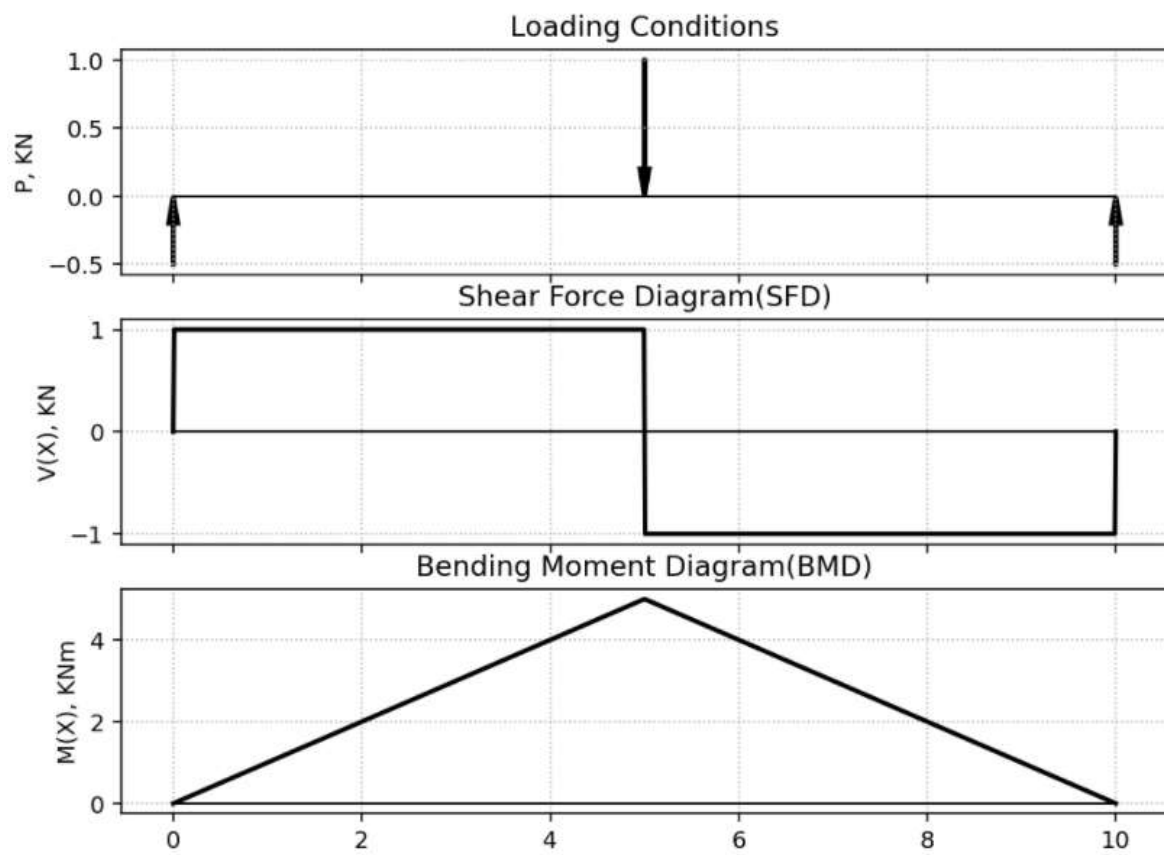
Q4. Plot shear force and bending moment diagrams of given beam with following format



The Shear force for given beam is given by:

$$V(X) = R_{Ay}\langle x - 0 \rangle^0 - 6\langle x - 1 \rangle^0 - 4\langle x - 3 \rangle^0 - 1\langle x - 3 \rangle^1 + 1\langle x - 5 \rangle^1 + R_E\langle x - 6 \rangle^0$$

The Loading Conditions, SFD and BMD should be in this format.



In []: