

Assignment 1

AI1110: Probability and Random Variables

Indian Institute of Technology Hyderabad

Pranav B
AI21BTECH11023

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Question 6(c) A hemispherical and a conical hole is scooped out of a solid wooden cylinder. Find the volume of the remaining solid where the measurements are as follows:

The height of the solid cylinder is 7 cm, radius of each of hemisphere, cone and cylinder is 3 cm. Height of cone is 3 cm.

Give your answer correct to the nearest whole number. Take $\pi = \frac{22}{7}$

Solution. The various parameters involved in this question are listed in Table

TABLE I
VARIABLES USED

| Parameter | Symbol |
|---|--------|
| Radius of cylinder(same as cone and hemisphere) | R |
| Height of cone removed | h |
| Height of cylinder | H |
| Volume of cylinder | V_1 |
| Volume of cone | V_2 |
| Volume of hemisphere | V_3 |

Given,

Radius of cylinder(R)=3 cm

Height of the cylinder(H)= 7 cm

Height of the cone removed(h)=3 cm

Volume of cylinder (V_1)= $\pi R^2 H$

Volume of Cone (V_2)= $\frac{1}{3}\pi R^2 h$

Volume of Hemisphere (V_3)= $\frac{2}{3}\pi R^3$

According to question Hemisphere, Cone are removed from Cylinder

\therefore remaining volume = $V_1 - V_2 - V_3$

= $\pi R^2 H - \frac{1}{3}\pi R^2 h - \frac{2}{3}\pi R^3$

Substituting the values above we get,

$\approx 113.142 \text{ cm}^3$