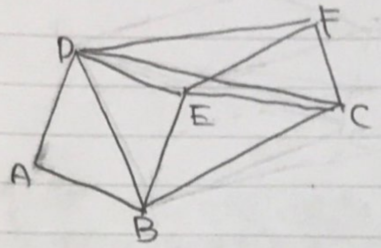
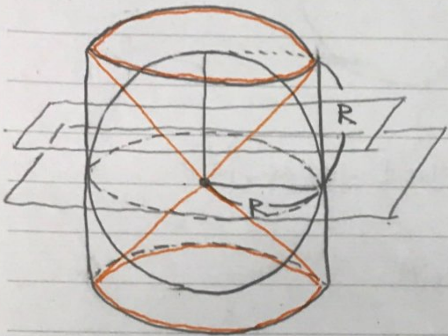
Date 7/11




3つの三角錐ABCD, DEBC, DECFの体積が等しいことをcavalieriの定理を証明せよ

→ report

球の体積

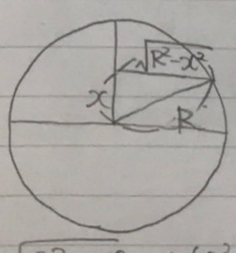


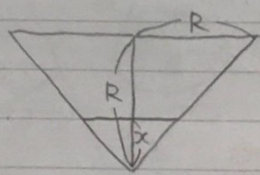

底面：半径Rの円
高さ：2R
円柱

円柱の体積 $= \pi R^2 \times 2R = 2\pi R^3$

円錐の体積 $= 2 \times \frac{1}{3}\pi R^2 \times R = \frac{2}{3}\pi R^3$

$2\pi R^3 - \frac{2}{3}\pi R^3 = \frac{4}{3}\pi R^3$

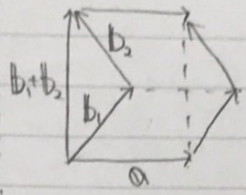



$\sqrt{R^2 - x^2}$ $\pi(R^2 - x^2)$

$\pi R^2 - \left(\frac{x}{R}\right)^2 \pi R^2$
$= \pi(R^2 - x^2)$

$S(a, b_1 + b_2) = S(a, b_1) + S(a, b_2)$




合同

内積
平面のベクトル

$a \cdot b = |a||b|\cos\theta$

$a \cdot a = |a|^2$

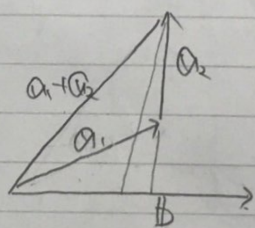
$a = \begin{pmatrix} a_1 \\ a_2 \end{pmatrix}$ $b = \begin{pmatrix} b_1 \\ b_2 \end{pmatrix}$

$\alpha, \beta \in \mathbb{R}$

$(\alpha a) \cdot b = \alpha\, a \cdot b$

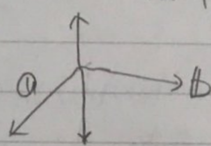
$a(\beta \cdot b) = \beta\, a \cdot b$

$(a_1 + a_2) b = a_1 b + a_2 b$




空間 $a \times b$ ：ベクトル積(外積)

幾何学的定義 $|a \times b|$ = aとbが張る平行四辺形の面積




$a, b, a \times b$ 右手系

$e_1 \times e_2 = e_3$ $e_2 \times e_1 = -e_3$

$\begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix} \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}$

$a \times b = -b \times a$

$a \times a = -a \times a$

$2a \times a = 0$

$a \times a = 0$

Date . .

$e_2 \times e_3 = e_1$

$e_3 \times e_2 = -e_1$

$e_3 \times e_1 = e_2$

$(\alpha a) \times b = \alpha a \times b$

$a \times (\beta b) = \beta a \times b$

$(a_1 + a_2) \times b = a_1 \times b + a_2 \times b$

$a \times (b_1 + b_2) = a \times b_1 + a \times b_2$

$$a = \begin{pmatrix} a_1 \\ a_2 \\ a_3 \end{pmatrix} = a_1 e_1 + a_2 e_2 + a_3 e_3$$

$$b = \begin{pmatrix} b_1 \\ b_2 \\ b_3 \end{pmatrix} = b_1 e_1 + b_2 e_2 + b_3 e_3$$

$a \times b =$

$\rightarrow$ report