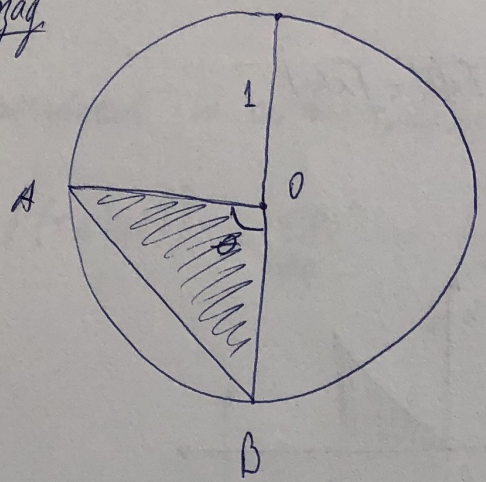
4) $\mathbb{E}(X^2+3X) = ?$

$= \mathbb{E}(X^2) + 3\mathbb{E}X = \frac{21}{40} + 3\cdot\frac{11}{16}$ — смятахме по

$\mathbb{E}(X^2+3X) = \int_0^1 (x^2+3x)\cdot \underbrace{\frac{3}{4}(x^2+2x)}_{f_X(x)} dx$ = смятахме...

Зад.

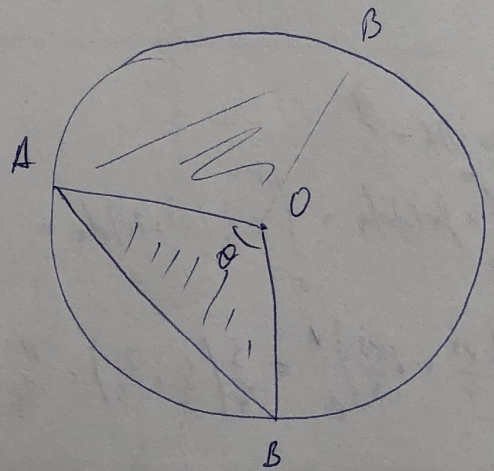


A - фиксирана

B - случайна от окр

$X = S_{AOB}$ = са вея

$\mathbb{E}X = ?$ $(\mathbb{E}S_{AOB} = ?)$



$\varphi \sim U([0,2\pi]) \Rightarrow f_\varphi(x) = \begin{cases} 0, & \text{ако } x \notin [0,2\pi] \\ \frac{1}{2\pi}, & \text{ако } x \in [0,2\pi] \end{cases}$

$S_{ABC} = \frac{ab\sin\gamma}{2}$

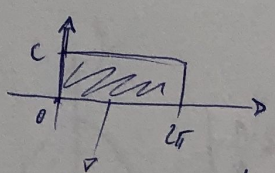
$S_{AOB} = \frac{\sin\varphi}{2}$ $\varphi \le \pi$

$S_{AOB} = \frac{-\sin\varphi}{2}$ $\varphi > \pi$, и.е. $S_{AOB} = \frac{|\sin\varphi|}{2}$

$\mathbb{E}S_{AOB} = \int_0^{2\pi} \frac{|\sin y|}{2}\, dy = 2\int_0^{\pi} \frac{\sin y}{2}\cdot\frac{1}{2\pi} dy = \frac{1}{2\pi}\int_0^{\pi} \sin y\, dy =$

$= \frac{1}{2\pi}(-\cos y)\Big|_0^{\pi} =$

$= \frac{1}{2\pi}\cdot 2 = \frac{1}{\pi}$



$c\cdot 2\pi \Rightarrow c = \frac{1}{2\pi}$

* В общия случай

$f_X(y) = \begin{cases} 0, & \text{ако } x \notin [a,b] \\ \frac{1}{b-a}, & \text{ако } x \in [a,b] \end{cases}$ $X \sim U([a,b])$

* $\varphi \sim U([0,\pi])$

$S_{AOB} = \frac{\sin\varphi}{2} \Rightarrow \mathbb{E}\cdot S_{AOB} = \int_0^{\pi} \frac{\sin y}{2}\cdot\frac{1}{\pi}\cdot dy$