**Задача 6**. Пресметнете определения интеграл  $\int_0^{\frac{\pi}{2}} \left| \frac{1}{2} - \sin^2 x \right| dx$ .

## Решение.

$$I = \int_0^{\frac{\pi}{2}} \left| \frac{1}{2} - \sin^2 x \right| dx = \int_0^{\frac{\pi}{2}} \left| \frac{1 - 2\sin^2 x}{2} \right| dx = \int_0^{\frac{\pi}{2}} \left| \frac{\cos^2 x - \sin^2 x}{2} \right| dx =$$

$$= \frac{1}{2} \int_0^{\frac{\pi}{2}} \left| \cos 2x \right| dx = \frac{1}{2} \int_0^{\frac{\pi}{4}} \cos 2x \, dx - \frac{1}{2} \int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \cos 2x \, dx =$$

$$= \frac{1}{4} \int_0^{\frac{\pi}{4}} \cos 2x \, d2x - \frac{1}{4} \int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \cos 2x \, dx = \frac{1}{4} \sin 2x \Big|_0^{\frac{\pi}{4}} - \frac{1}{4} \sin 2x \Big|_{\frac{\pi}{4}}^{\frac{\pi}{2}} =$$

$$= \frac{1}{4} - \frac{1}{4} \times 0 - \frac{1}{4} \times 0 + \frac{1}{4} = \frac{1}{2}.$$