Тема 8 „Понятие об интеграле"

① Найти неопр. инт-л:

$$\int (2x^2 - 2x - 1 + \sin x - \cos x + \ln x + e^x)\,dx = \frac{2x^3}{3} - x^2 - x - \cos x - \sin x + \ln x \cdot x - x + e^x = \frac{2x^3}{3} - x^2 - 2x - \cos x - \sin x + \ln x \cdot x + e^x + C, \; C \in R$$

② $$\int (2x + 6xz^2 - 5x^2 y - 3\ln z)\,dx = x^2 + 3z^2x^2 - \frac{5yx^3}{3} - 3\ln(z)\cdot x + C, \; C \in R$$

③ $$\int_0^{\pi} 3x^2 \sin(2x)\,dx = 3 \cdot \int \frac{t^2 \cdot \sin(t)}{8}\,dt$$

$t = 2x$

$$= \frac{3}{8}\int t^2 \cdot \sin(t) \cdot dt = \frac{3}{8}\left(t^2 \cdot (-\cos t) - \int -\cos t \cdot 2t \cdot dt\right) = \frac{3}{8}\cdot\left(t^2 \cdot (-\cos t) - 1 \cdot (-2) \int \cos t \cdot t\, dt\right) = \frac{3}{8}\left(t^2 \cdot (-\cos t) + 2(t \cdot \sin t - (-\cos t))\right) = -\frac{3x^2 \cdot \cos 2x + 3x \cdot \sin 2x}{2} + \frac{3\cos 2x}{4}\Bigg|_0^{\pi} = -\frac{3\pi^2}{2}$$

(4) $\int \frac{1}{\sqrt{x+1}}\,dx = \int \frac{1}{\sqrt{t}}\,dt =$

$x+1=t$

$= 2\sqrt{t} = 2\sqrt{x+1} =$

$= 2\sqrt{x+1} + C, \; C \in R$