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

№9.2.47

$\int_0^1 \ln x \, dx = [\lim_{x\to 0} \ln x = -\infty \Rightarrow$

$\Rightarrow$ разрыв II рода при $x=0$] $=$

$= \lim_{\varepsilon\to 0} \int_{0+\varepsilon}^{1} \ln x \, dx =$

$= [\int \ln x \, dx = \left[\begin{matrix} u = \ln x \\ v' = 1 \end{matrix} \Rightarrow\right.$

$\Rightarrow \left.\begin{matrix} u' = \frac{1}{x} \\ v = x \end{matrix}\right] = x \ln x - \int \frac{x}{x} dx = x \ln x -$

$- \int dx = x \ln x - x] = \lim_{\varepsilon\to 0} (x \ln x - x)\Big|_{\varepsilon}^{1} =$

$= \lim_{\varepsilon\to 0} (1 \cdot \overset{0}{\ln 1} - 1 - \varepsilon \cdot \ln\varepsilon + \varepsilon) =$

$= \lim_{\varepsilon\to 0} (-1 - \varepsilon \ln \varepsilon + \varepsilon) = -1 - 0 + 0 =$

$= -1 \Rightarrow$ инт. сх.

№9.2.51

$\int_{-1}^{1} \frac{dx}{x^2} = [\lim_{x\to 0} \frac{1}{x^2} = \infty \Rightarrow$

$\Rightarrow$ внутренний разрыв в $x=0$] $=$

$$= \int_{-1}^{0} \frac{dx}{x^2} + \int_{0}^{1} \frac{dx}{x^2} = \lim_{\varepsilon \to 0} \left(\int_{-1}^{0+\varepsilon} \frac{dx}{x^2} + \right.$$

$$\left. + \lim_{\delta \to 0} \int_{0+\delta}^{1} \frac{dx}{x^2} \right) = \left[\int \frac{dx}{x^2} = -\frac{1}{x} \right] =$$

$$\cancel{= \lim_{\varepsilon \to 0} \left(\left(-\frac{1}{x}\right)\Big|_{-1}^{\varepsilon} + \left(-\frac{1}{x}\right)\Big|_{\varepsilon}^{+1} \right) =}$$

$$\cancel{= \lim_{\varepsilon \to 0} \left(-\frac{1}{\varepsilon} + \frac{1}{-1} - \frac{1}{1} + \frac{1}{\varepsilon} \right) =}$$

$$\cancel{= \lim_{\varepsilon \to 0} (-2) = -2}$$

$$= \lim_{\varepsilon \to 0} \left(-\frac{1}{x}\right)\Big|_{-1}^{\varepsilon} + \lim_{\delta \to 0} \left(-\frac{1}{x}\right)\Big|_{\delta}^{1} =$$

$$= \lim_{\varepsilon \to 0} \left(-\frac{1}{\varepsilon} - 1 \right) + \lim_{\delta \to 0} \left(-1 + \frac{1}{\delta} \right) =$$

$$= \lim_{\delta \to 0} \frac{1}{\delta} - 1 - \lim_{\varepsilon \to 0} \frac{1}{\varepsilon} - 1 = \infty \Rightarrow$$

$\Rightarrow$ интеграл расх.

<u>№9.2.55.</u>

$$\int_0^1 \frac{\cos^2 x}{\sqrt[3]{(1-x^2)^2}}\, dx = [\text{разрыв в точке}$$

$$x = 1] = \int_0^1 \frac{\cos^2 x}{(1+x)^{\frac{2}{3}}} \cdot \frac{1}{(1-x)^{\frac{2}{3}}} =$$

$= \left[\varphi(x) = \frac{1}{(1-x)^{\frac{2}{3}}},\ f(x)$ - наша ф-ция;

$\int_0^1 \frac{1}{(1-x)^{\frac{2}{3}}} dx$ - сх., т.к. $\alpha = \frac{2}{3} < 1 \right] =$

$$= \lim_{x \to 1} \frac{\cos^2 x}{(1+x)^{\frac{2}{3}}} \cdot \frac{1}{(1-x)^{\frac{2}{3}}} \cdot \frac{(1-x)^{\frac{2}{3}}}{1} =$$

$$= \lim_{x \to 1} \frac{\cos^2 x}{(1+x)^{\frac{2}{3}}} = \frac{\cos^2 1}{2^{\frac{2}{3}}} =$$

$$= \frac{\cos^2 1}{\sqrt[3]{4}} \ (\neq 0, \neq \infty) \Rightarrow$$

$\Rightarrow$ по предельному признаку ф-ция $\int_0^1 f(x)\,dx$ - сх., т.к. $\int_0^1 \varphi(x)\,dx$ - сх.

№ 9 2.58

$\int_0^1 \frac{dx}{3x^2 + \sqrt[3]{x}}$; $f(x)$ имеет разрыв в т. $x = 0$. $\left.\right] \varphi(x) = \frac{1}{\sqrt[3]{x}}$.

$f(x) < \varphi(x)$, $\int_0^1 \varphi(x)\,dx$ - сх., т.к.

$\alpha = \frac{1}{3} < 1 \Rightarrow \int_0^1 f(x)\,dx = \int_0^1 \frac{dx}{3x^2 + \sqrt[3]{x}}$ -

- сх. по признаку сравнения.