

C Alexey A Bykov, 16 Feb 2008.

Moscow State University, Department of physics, boombook@yandex.ru, boombook.narod.ru

for seminar

$$\int_0^2 x \cdot (2-x) dx \rightarrow \frac{4}{3} \quad \int_0^2 x^2 \cdot (2-x)^3 dx \rightarrow \frac{16}{15} \quad \int_0^3 x^3 \cdot (3-x)^2 dx \rightarrow \frac{243}{20}$$

$$\int_0^1 \frac{1}{4-x^2} dx \rightarrow \frac{1}{4} \cdot \ln(3) \quad \int_0^1 \frac{x}{4-x^2} dx \rightarrow \frac{-1}{2} \cdot \ln(3) + \ln(2)$$

$$\int_2^3 \frac{1}{x^2-6x+5} dx \rightarrow \frac{-1}{4} \cdot \ln(3) \quad \int_2^3 \frac{x}{x^2-6x+5} dx \rightarrow \ln(2) - \frac{5}{4} \cdot \ln(3)$$

$$\int_2^3 \frac{x^2}{x^2-6x+5} dx \rightarrow 1 + 6 \cdot \ln(2) - \frac{25}{4} \cdot \ln(3)$$

$$\int_1^2 \frac{1}{x-3} dx \rightarrow -\ln(2) \quad \int_1^2 \frac{1}{x^2-6x+9} dx \rightarrow \frac{1}{2} \quad \int_0^1 \frac{1}{x^3+3x^2+3x+1} dx \rightarrow \frac{3}{8}$$

$$\int_0^1 \frac{1}{x^2+1} dx \rightarrow \frac{1}{4} \cdot \pi \quad \int_0^{\frac{1}{2}} \frac{1}{\sqrt{1-x^2}} dx \rightarrow \frac{1}{6} \cdot \pi$$

$$\int_0^1 \frac{x}{x^2+1} dx \rightarrow \frac{1}{2} \cdot \ln(2) \quad \int_0^{\frac{1}{2}} \frac{x}{\sqrt{1-x^2}} dx \rightarrow 1 - \frac{1}{2} \cdot 3^{\frac{1}{2}}$$

$$\int_0^1 \frac{1}{x^2+x+1} dx \rightarrow \frac{1}{9} \cdot 3^{\frac{1}{2}} \cdot \pi \quad \int_0^1 \frac{x}{x^2+x+1} dx \rightarrow \frac{1}{2} \cdot \ln(3) - \frac{1}{18} \cdot 3^{\frac{1}{2}} \cdot \pi$$

$$\int_0^{\pi} \sin(x) dx \rightarrow 2 \quad \int_0^{\frac{\pi}{2}} \cos(x) dx \rightarrow 1$$

$$\int_0^{\pi} \sin(x)^2 dx \rightarrow \frac{1}{2} \cdot \pi \quad \int_0^{\frac{\pi}{2}} \cos(x) \cdot \sin(x)^4 dx \rightarrow \frac{1}{5} \quad \int_0^{\frac{\pi}{2}} \cos(x)^3 \cdot \sin(x)^3 dx \rightarrow \frac{1}{12}$$

$$\int_0^{\frac{\pi}{2}} \cos(x) \cdot \sin(x)^{2008} dx \rightarrow \frac{1}{2009} \quad \int_0^{\frac{\pi}{2}} \cos(x)^3 \cdot \sin(x)^{10} dx \rightarrow \frac{2}{143} \quad \int_0^{\frac{\pi}{2}} \cos(x)^5 \cdot \sin(x)^5 dx \rightarrow \frac{1}{60}$$

$$\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{1}{\sin(x)^2} dx \rightarrow \frac{2}{3} \cdot 3^{\frac{1}{2}}$$

$$\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{1}{\sin(x)} dx \rightarrow \frac{-1}{2} \cdot \ln(3) - \ln\left(2 - 3^{\frac{1}{2}}\right)$$

$$\int_0^{\pi} x \cdot \sin(x) dx \rightarrow \pi \quad \int_0^{\pi} x^2 \cdot \sin(x) dx \rightarrow \pi^2 - 4$$

$$\int_0^1 x \cdot e^x dx \rightarrow 1 \quad \int_0^1 x^2 \cdot e^x dx \rightarrow \exp(1) - 2 \quad \int_0^1 x^3 \cdot e^{2x} dx \rightarrow \frac{1}{8} \cdot \exp(2) + \frac{3}{8}$$

$$\int_0^{\pi} \sin(x) \cdot e^x dx \rightarrow \frac{1}{2} \cdot \exp(\pi) + \frac{1}{2} \quad \int_{-\pi}^{\pi} \cos(x) \cdot e^{2x} dx \rightarrow \frac{-2}{5} \cdot \exp(2 \cdot \pi) + \frac{2}{5} \cdot \exp(-2 \cdot \pi)$$

$$\int_1^e \sin(\ln(x)) dx \rightarrow \frac{1}{2} \cdot \sin(1) \cdot \exp(1) - \frac{1}{2} \cdot \exp(1) \cdot \cos(1) + \frac{1}{2}$$

$$\int_0^{\sqrt{\pi}} x \cdot \sin(x^2) dx \rightarrow 1 \quad \int_1^{\sqrt{e}} x \cdot \ln(x^2) dx \rightarrow \frac{1}{2} \quad \int_1^4 \frac{1}{\sqrt{x}} \cdot e^{\sqrt{x}} dx \rightarrow 2 \cdot \exp(2) - 2 \cdot \exp(1)$$

$$\int_{\frac{1}{\sqrt{3}}}^{\sqrt{3}} \operatorname{atan}(x) dx \rightarrow \frac{5}{18} \cdot 3^{\frac{1}{2}} \cdot \pi - \frac{1}{2} \cdot \ln(3) \quad \int_{\frac{1}{\sqrt{3}}}^{\sqrt{3}} x \cdot \operatorname{atan}(x) dx \rightarrow \frac{5}{9} \cdot \pi - \frac{1}{3} \cdot 3^{\frac{1}{2}}$$

$$\int_{\frac{1}{\sqrt{3}}}^{\sqrt{3}} \frac{\operatorname{atan}(x)}{1+x^2} dx \rightarrow \frac{1}{24} \cdot \pi^2 \quad \int_{\frac{1}{\sqrt{3}}}^{\sqrt{3}} \frac{\operatorname{atan}(x)^3}{1+x^2} dx \rightarrow \frac{5}{1728} \cdot \pi^4 \quad \int_{\frac{1}{3}}^3 \frac{\operatorname{atan}(\sqrt{x})}{(1+x) \cdot \sqrt{x}} dx \rightarrow \frac{1}{12} \cdot \pi^2$$

$$\int_{\frac{1}{2}}^{\frac{\sqrt{3}}{2}} \text{asin}(x) \, dx \rightarrow \frac{1}{6} \cdot 3^{\frac{1}{2}} \cdot \pi + \frac{1}{2} - \frac{1}{12} \cdot \pi - \frac{1}{2} \cdot 3^{\frac{1}{2}}$$

$$\int_{\frac{1}{2}}^{\frac{\sqrt{3}}{2}} x \cdot \text{asin}(x) \, dx \rightarrow \frac{1}{16} \cdot \pi$$

$$\int_{\frac{1}{2}}^{\frac{\sqrt{3}}{2}} \frac{\text{asin}(x)}{\sqrt{1-x^2}} \, dx \rightarrow \frac{1}{24} \cdot \pi^2$$

$$\int_{\frac{1}{4}}^{\frac{3}{4}} \frac{\text{asin}(\sqrt{x})}{\sqrt{x} \cdot \sqrt{1-x}} \, dx \rightarrow \frac{1}{12} \cdot \pi^2$$

die hard

$$\int_0^1 x \cdot \ln(x) \, dx \rightarrow \frac{-1}{4}$$

$$\int_0^1 x^2 \cdot \ln(x) \, dx \rightarrow \frac{-1}{9}$$

$$\int_0^1 x^3 \cdot \ln(x) \, dx \rightarrow \frac{-1}{16}$$

$$\int_1^e x \cdot \ln(x) \, dx \rightarrow \frac{1}{4} \cdot \exp(2) + \frac{1}{4}$$

$$\int_1^e x^2 \cdot \ln(x) \, dx \rightarrow \frac{2}{9} \cdot \exp(3) + \frac{1}{9}$$