19. $\int_{-1}^{1}\left(\underbrace{x^3\cos x}_{\substack{\text{Tek}\\ \text{Fonk.}\\ 0}}+\underbrace{\sin^7 x}_{\substack{\text{Tek}\\ \text{f.}\\ 0}}-\underbrace{x^2\sin x}_{\substack{\text{Tek}\\ \text{fonk.}\\ 0}}+\underbrace{x^4}_{\substack{\text{Çift}\\ \text{Fonk.}}}\right)dx=?$ A) $\frac{\cos 1}{3}+\frac{4}{5}$ B) $\frac{2}{5}$ C) $\frac{\cos 1}{3}-\frac{4}{5}$ D) $\frac{3}{5}$ E) 0

$$\int_{-1}^{1}\left(\cancelto{0}{x^3\cos x}+\cancelto{0}{\sin^7 x}-\cancelto{0}{x^2\sin x}+x^4\right)dx=\int_{-1}^{1}x^4\,dx=\frac{x^5}{5}\Big|_{-1}^{1}=\frac{2}{5}$$

$\int\left(\frac{2x}{x^2+3}-e^{5x}+\sin 4x-\frac{1}{x^2+9}\right)dx=?$

A) $\ln\left(x^2+3\right)-\frac{e^{5x}}{5}-\frac{\cos 4x}{4}-\frac{1}{3}\arctan\frac{x}{3}+c$

B) $\frac{1}{\sqrt{3}}\arctan\frac{x}{\sqrt{3}}-\frac{e^{5x}}{5}+4\cos 4x-\ln\left(x^2+9\right)+c$

C) $\ln\left(x^2+3\right)-\frac{e^{5x}}{5}-4\cos 4x-\arctan\frac{x}{3}+c$

D) $\frac{1}{\sqrt{3}}\arctan\frac{x}{\sqrt{3}}-5e^{5x}+4\cos 4x-\ln\left(x^2+9\right)+c$

E) $\ln\left(x^2+3\right)-5e^{5x}-\frac{\cos 4x}{4}-\arctan\frac{x}{3}+c$

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20. $\lim_{x\to 0}\frac{\int_0^{x^2}\sin(t^2)\,dt}{2x^6}=?$ A) ∞ B) 0 C) $\frac{1}{4}$ D) $\frac{1}{2}$ E) $\frac{1}{6}$

↳ $\frac{0}{0}$ → L'H.

$$\lim_{x\to 0}\frac{2x.\sin(x^2)^2-0}{12x^5}=\lim_{x\to 0}\frac{\overbrace{\sin x^4}^{\to 1}}{6x^4}=\frac{1}{6}$$

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21. $\int\frac{dt}{t^2.(t^4-16)}$ integralinin basit kesirlere ayrılmış hali → $t^2.(t-2)(t+2)(t^2+4)$ → 5 çarpan var 5 kesir olmalı

aşağıdakilerden hangisi olabilir?

A) $\int\left(\frac{A}{t}+\frac{B}{t^2}+\frac{C}{t+2}+\frac{D}{(t-2)^2}+\frac{Et+F}{t^2+4}\right)dt$

B) $\int\left(\frac{A}{t}+\frac{B}{t-2}+\frac{C}{t+2}+\frac{Dt+E}{t^2+4}\right)dt$

C) $\int\left(\frac{A}{t}+\frac{B}{t-2}+\frac{Ct+D}{(t-2)^2}+\frac{E}{t+2}+\frac{Ft+G}{t^2+4}\right)dt$

D) $\int\left(\frac{A}{t}+\frac{B}{t^2}+\frac{C}{t-2}+\frac{D}{t+2}+\frac{Et+F}{t^2+4}\right)dt$

E) $\int\left(\frac{A}{t}+\frac{B}{t^2}+\frac{C}{t+2}+\frac{Dt+E}{t^2+4}\right)dt$

(22) $F(x)=\int_0^x \cos\left(\pi t^2\right) dt$ eğrisinin $x=\frac{1}{\sqrt{6}}$ noktasındaki teğetinin eğimi aşağıdakilerden hangisidir?

$\Rightarrow F'\left(\frac{1}{\sqrt{6}}\right)$ yı soruyor.

A) $\frac{\sqrt{3}}{2}$ B) 1 C) $\frac{\pi}{\sqrt{3}}-1$ D) $1-\frac{1}{\sqrt{3}}$ E) $\sqrt{3}-1$

$F'(x)=\cos\pi x^2 \rightarrow F'\left(\frac{1}{\sqrt{6}}\right)=\cos\frac{\pi}{6}=\frac{\sqrt{3}}{2}$

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(23) $\int_{\frac{\pi}{4}}^{\frac{\pi}{2}} (\sin x)^3\, dx = ?$

A) 1 B) $\frac{\sqrt{3}}{8}$ C) $\frac{2}{3}-\frac{5\sqrt{2}}{12}$ D) $\frac{2}{3}-\frac{\sqrt{3}}{8}$ E) $\frac{5\sqrt{2}}{12}$

$\int_{\pi/4}^{\pi/2} \sin^2 x.\sin x\, dx = \int_{\pi/4}^{\pi/2} (1-\cos^2 x)\sin x\, dx$

$\cos x = u \quad -\sin x\, dx = du$

$x=\frac{\pi}{2} \rightarrow u=0$

$x=\frac{\pi}{4} \rightarrow u=\frac{\sqrt{2}}{2}$

$= \int_{\sqrt{2}/2}^{0} (1-u^2)(-du) = \int_0^{\sqrt{2}/2} (1-u^2)\, du = u-\frac{u^3}{3}\Big|_0^{\frac{\sqrt{2}}{2}} = \frac{\sqrt{2}}{2}-\frac{\sqrt{2}}{12}=\frac{5\sqrt{2}}{12}$

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(24) $\int_1^{e^{\frac{\pi}{4}}} \frac{\sec^2(\ln x)}{x}\, dx = ?$

$\ln x = u \quad \frac{dx}{x}=du$

$x=e^{\pi/4} \rightarrow u=\pi/4$

$x=1 \rightarrow u=0$

A) $e^{\frac{\pi}{4}}-\ln\frac{\sqrt{2}}{2}$ B) 1 C) $\frac{\pi}{4}-1$ D) $1-\ln\sqrt{2}$ E) $\frac{\pi^3}{4^3}+\ln\sqrt{2}$

$\int_0^{\pi/4} \sec^2 u\, du = \tan u\Big|_0^{\pi/4} = 1$

25) $\int \frac{x^3}{\sqrt{5+x^2}}dx$ integralini çözebilmek için yapılması gereken trigonometrik dönüşüm ve bu dönüşüm sonrası oluşan yeni integral aşağıdakilerin hangisinde doğru verilmiştir?

A) Yapılması gereken dönüşüm: $x=\sqrt{5}\tan t$, Yeni integral : $\int 5\sqrt{5}(\tan t)^3.(\sec t)^2\,dt$

B) Yapılması gereken dönüşüm: $x=5\sin t$, Yeni integral : $\int \sqrt{5}(\sin t)^3.\cos t\,dt$

C) Yapılması gereken dönüşüm: $x=5\tan t$, Yeni integral : $\int (\tan t)^3.\sec t\,dt$

D) Yapılması gereken dönüşüm: $x=\sqrt{5}\sin t$, Yeni integral : $\int 5\sqrt{5}(\sin t)^3\,dt$

E) Yapılması gereken dönüşüm: $x=\sqrt{5}\tan t$, Yeni integral : $\int 5\sqrt{5}(\tan t)^3.\sec t\,dt$

$x=\sqrt{5}\,\mathrm{Tan}t \qquad dx=\sqrt{5}\,\mathrm{Sec}^2t\,dt \qquad \sqrt{5+x^2}=\sqrt{5+5\mathrm{Tan}^2t}=\sqrt{5}\,\mathrm{Sec}t$

$$\int\frac{x^3}{\sqrt{5+x^2}}dx=\int\frac{5\sqrt{5}\,\mathrm{Tan}^3t}{\cancel{\sqrt{5}}\,\cancel{\mathrm{Sec}t}}\cdot\cancel{\sqrt{5}}\,\mathrm{Sec}^{\cancel{2}}t=\int 5\sqrt{5}\,\mathrm{Tan}^3t\,\mathrm{Sec}t\,dt$$

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26) $\int_0^5 \operatorname{arccot} x\,dx=?$ A) $25\operatorname{arccot}5$ B) $5\operatorname{arccot}5+\ln 26$ C) $5\operatorname{arccot}5+\frac{\ln 26}{2}$ D) $25\operatorname{arccot}5+\frac{\ln 26}{2}$ E) $25\operatorname{arccot}5+\ln 26$

Kısmi int.

$u=\mathrm{Arccot}x \qquad du=-\frac{dx}{1+x^2}$

$dv=dx \qquad v=x$

$$\int_0^5\mathrm{Arccot}x\,dx=x\,\mathrm{Arccot}x\Big|_0^5+\int_0^5\underbrace{\frac{x}{1+x^2}dx}_{\frac{1}{2}\ln(1+x^2)}$$

$$=5\,\mathrm{Arccot}5+\frac{1}{2}\ln(1+x^2)\Big|_0^5$$

$$=5\,\mathrm{Arccot}5+\frac{1}{2}\ln 26$$