

3. Evaluate: $\int_0^{\pi/2} \frac{\cos x}{(1+\sin x)(2+\sin x)} dx$

$\underbrace{\hspace{10em}}_{1+1+\sin x}$

Let $1 + \sin x = t$; $x=0, t=1; x=\pi/2, t=2$
 $\cos x dx = dt$

$$\therefore I = \int_1^2 \frac{dt}{t(1+t)} = \int_1^2 \frac{dt}{t} + \int_1^2 \frac{dt}{1+t} \quad \frac{1}{t(t+1)} = \frac{A}{t} + \frac{B}{1+t}$$

$$= [\log t]_1^2 - [\log(1+t)]_1^2 = \log 2 - \log 3 + \log 2$$

$$= 2 \log 2 - \log 3 = \log 2^2 - \log 3 = \log \frac{4}{3}$$

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Q: Evaluate $\int_{\frac{1}{3}}^1 \frac{(x-x^3)^{\frac{1}{3}}}{x^4} dx$

PROPERTIES OF DEFINITE INTEGRALS:

1. $\int_a^b f(x) dx = \int_a^b f(t) dt$

2. $\int_a^b f(x) dx = -\int_b^a f(x) dx$

3. $\int_a^b f(x) dx = \int_a^c f(x) dx + \int_c^b f(x) dx$ $a < c < b$

$$4. \int_a^b f(x) dx = \int_a^b f(a+b-x) dx$$

$$5. \int_0^a f(x) dx = \int_0^a f(a-x) dx$$

$$6. \int_0^{2a} f(x) dx = \int_0^a f(x) dx + \int_0^a f(2a-x) dx$$

$$7. \int_{-a}^a f(x) dx = 0 \longrightarrow f(x) \text{ is odd fund}^n$$

$$= 2 \int_0^a f(x) dx \longrightarrow$$

Even.
 $f(-x) = f(x)$
 eg: $\cos x$
 x^2
 Odd: $f(-x) = -f(x)$
 eg: $\sin x$
 x

18. 1. $f(x) = \frac{1}{x^2}$
 $\int_1^2 \frac{1}{x^2} dx = \int_1^2 x^{-2} dx = \left[-x^{-1} \right]_1^2 = \left[-\frac{1}{x} \right]_1^2 = -\frac{1}{2} - \left(-\frac{1}{1}\right) = -\frac{1}{2} + 1 = \frac{1}{2}$

19. 2. Evaluate: $\int_0^1 (x^2 + 1) dx$
 $\int_0^1 (x^2 + 1) dx = \left[\frac{x^3}{3} + x \right]_0^1 = \left(\frac{1^3}{3} + 1 \right) - \left(\frac{0^3}{3} + 0 \right) = \frac{1}{3} + 1 = \frac{4}{3}$

20. 3. Evaluate: $\int_0^1 x \sqrt{x} dx$
 $\int_0^1 x \sqrt{x} dx = \int_0^1 x^{3/2} dx = \left[\frac{2}{5} x^{5/2} \right]_0^1 = \frac{2}{5} (1^{5/2} - 0^{5/2}) = \frac{2}{5}$

21. 4. Evaluate: $\int_0^1 x^2 dx$
 $\int_0^1 x^2 dx = \left[\frac{x^3}{3} \right]_0^1 = \frac{1^3}{3} - \frac{0^3}{3} = \frac{1}{3}$

22. 5. Evaluate: $\int_0^1 x^2 dx$
 $\int_0^1 x^2 dx = \left[\frac{x^3}{3} \right]_0^1 = \frac{1^3}{3} - \frac{0^3}{3} = \frac{1}{3}$

23. 6. Evaluate: $\int_0^1 x^2 dx$
 $\int_0^1 x^2 dx = \left[\frac{x^3}{3} \right]_0^1 = \frac{1^3}{3} - \frac{0^3}{3} = \frac{1}{3}$

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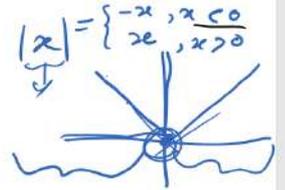
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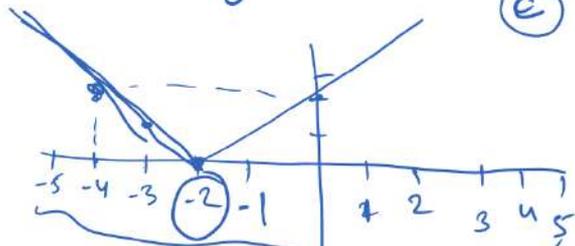
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1. Evaluate: $\int_{-5}^5 |x+2| dx$



$$\int_a^b f(x) dx = \int_a^c f(x) dx + \int_c^b f(x) dx$$



$$= \int_{-5}^{-2} -(x+2) dx + \int_{-2}^5 (x+2) dx$$

$$= -\left[\frac{x^2}{2} + 2x\right]_{-5}^{-2} + \left[\frac{x^2}{2} + 2x\right]_{-2}^5$$

$$= \frac{25}{2} - 10 - 2 + 4 + \left(\frac{25}{2} + 10 - 2 + 4\right)$$

$25 + 4 = 29$ Ans.

19. Evaluate: $\int_{-1}^1 x^2 dx$

20. Evaluate: $\int_{-1}^1 x^3 dx$

21. Evaluate: $\int_{-1}^1 x^4 dx$

22. Evaluate: $\int_{-1}^1 x^5 dx$

23. Evaluate: $\int_{-1}^1 x^6 dx$

24. Evaluate: $\int_{-1}^1 x^7 dx$