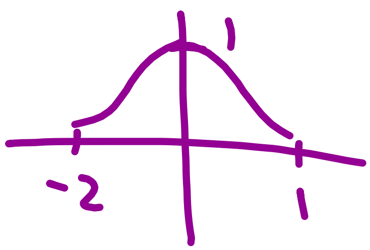
9. If $\int_{-1}^{1} e^{-x^2}\,dx = k$, then $\int_{-1}^{0} e^{-x^2}\,dx =$ $\frac{k}{2}$

(A) $-2k$ (B) $-k$ (C) $-\frac{k}{2}$ (D) $\frac{k}{2}$ (E) $2k$

$f(-x) = f(x)$

$\boxed{2\int_0^a E(x)\,dx} = \int_{-a}^{a} E(x)\,dx$

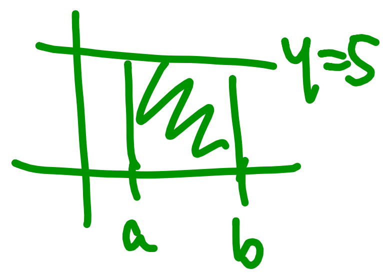


$0 = \int_{-a}^{a} O(x)\,dx$

3. If $\int_a^b f(x)\,dx = a + 2b$, then $\int_a^b (f(x)+5)\,dx =$

(A) $a+2b+5$ (B) $5b-5a$ (C) $7b-4a$ (D) $7b-5a$ (E) $7b-6a$

$$\int_a^b f(x)dx + \int_a^b 5dx$$



$$= a+2b+5(b-a)$$

$$= -4a+7b$$

15. The area of the region bounded by the lines $x = 0$, $x = 2$, and $y = 0$ and the curve $y = e^{\frac{x}{2}}$ is

(A) $\frac{e-1}{2}$ (B) $e-1$ (C) $\boxed{2(e-1)}$ (D) $2e-1$ (E) $2e$

$y = e^{x/2}$

$$\int_0^2 e^{x/2}\,dx = 2e^{x/2}\Big]_0^2$$

$$= 2e - 2$$

21. $\int_0^1 (x+1)e^{x^2+2x}\,dx =$ $\frac{1}{2}\int e^u du = \frac{1}{2}e^u \Big] = \frac{1}{2}e^{x^2+2x}\Big]_0^1$

(A) $\frac{e^3}{2}$ (B) $\frac{e^3-1}{2}$ (C) $\frac{e^4-e}{2}$ (D) e^3-1 (E) e^4-e

$u = x^2+2x$

$du = (2x+2)dx$

$\frac{du}{2} = (x+1)dx$

$= \frac{1}{2}e^3 - \frac{1}{2}$

22. An antiderivative for $\dfrac{1}{x^2-2x+2}$ is

(A) $-(x^2-2x+2)^{-2}$

(B) $\ln(x^2-2x+2)$

(C) $\ln\left|\dfrac{x-2}{x+1}\right|$

(D) $\operatorname{arcsec}(x-1)$

(E) $\arctan(x-1)$

$$\frac{1}{\underbrace{x^2-2x+1}+1}$$

$$= \frac{1}{1+(x-1)^2}$$

$$\int \frac{1}{1+(x-1)^2}\,dx$$

$u = x-1$

$du = dx$

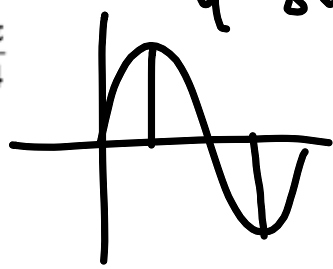
$$\int \frac{1}{1+u^2}\,du = \arctan u + C$$

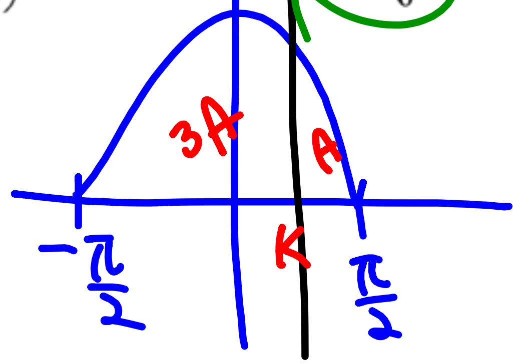
13. The region bounded by the x-axis and the part of the graph of $y = \cos x$ between $x = -\frac{\pi}{2}$ and $x = \frac{\pi}{2}$ is separated into two regions by the line $x = k$. If the area of the region for $-\frac{\pi}{2} \le x \le k$ is three times the area of the region for $k \le x \le \frac{\pi}{2}$, then $k =$

(A) $\arcsin\left(\frac{1}{4}\right)$ (B) $\arcsin\left(\frac{1}{3}\right)$ (C) $\frac{\pi}{6}$

(D) $\frac{\pi}{4}$ (E) $\frac{\pi}{3}$

y=sinx





$$\int_{-\pi/2}^{\pi/2} \cos x\,dx = 2$$

$$4A = 2$$
$$A = \frac{1}{2}$$

$$\int_{k}^{\pi/2} \cos x\,dx = \frac{1}{2} = \sin x\Big]_{k}^{\frac{\pi}{2}} = 1 - \sin k$$

$$\sin k = \frac{1}{2}$$

$$k = \frac{\pi}{6}$$

24. If $\int_{-2}^{2} \left(x^7 + k\right) dx = 16$, then $k =$

(A) −12 (B) −4 (C) 0 (D) 4 (E) 12

$$\left.\frac{x^8}{8} + kx\right]_{-2}^{2} = 16 \quad \Big\| \quad \underbrace{\int_{-2}^{2} x^7\,dx}_{0} + \int_{-2}^{2} k\,dx = 16$$

$4k = 16$

$k = 4$