

Definite Integrals Ex 20.3 Q27

[x]=0 for 0
and [x]=1 for 1
Hence
$$\int_{0}^{1} 0 + \int_{1}^{2} 2x dx$$
$$\left\{x^{2}\right\}_{1}^{2}$$
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Definite Integrals Ex 20.3 Q18

$$\int_{0}^{2\pi} \cos^{-1}(\cos x) dx$$

$$= -\int_{0}^{\pi} \cos^{-1}(\cos x) dx + \int_{\pi}^{2\pi} \cos^{-1}(\cos x) dx$$

$$= -\int_{0}^{\pi} x dx + \int_{\pi}^{2\pi} x dx$$

$$= -\left[\frac{x^{2}}{2}\right]_{0}^{\pi} + \left[\frac{x^{2}}{2}\right]_{\pi}^{2\pi}$$

$$= -\frac{\pi^{2}}{2} + \frac{4\pi^{2}}{2} - \frac{\pi^{2}}{2}$$

$$= \pi^{2}$$

Definite Integrals Ex 20.3 Q33

Let
$$I = \int_a^b \frac{f(x)}{f(x) + f(a+b-x)} dx$$
 --(i)

We know that $\int_{a}^{b} f(x) = \int_{a}^{b} f(a+b-x)dx$

Then

$$I = \int_{a}^{b} \frac{f(a+b-x)}{f(a+b-x)+f(a+b-(a+b-x))} dx$$

$$I = \int_{a}^{b} \frac{f(a+b-x)}{f(a+b-x)f(x)} dx --(ii)$$

Adding (i) & (ii)

$$2I = \int_{a}^{b} \frac{f(x) + f(a+b-x)}{f(x) + f(a+b-x)} dx$$

$$2I = \int_{a}^{b} dx$$

$$I = \left[x\right]_{a}^{b}$$

$$I = \frac{1}{2} \left[b - a\right]$$

$$I = \frac{b-a}{2}$$

********** END *******