Definite Integrals Ex 20.3 Q27

[x]=0 for 0
and [x]=1 for 1
Hence

$$\int_0^1 0 + \int_1^2 2x\,dx$$

$$\left\{x^2\right\}_1^2$$

$$3$$

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

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

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

Adding (i) & (ii)

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

$$2I = \int_a^b dx$$

$$I = [x]_a^b$$

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

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

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