Solutions

Integration by Farts

December 2021

Catch all for any questions not submitted below

If we did not explicitly specify the answer to a question in one of the sections below, then we sumbit the number 0 for indefinite integrals and "the integral does not exist" for definite integrals. Otherwise use the answer we did write down in one of the sections below.

Q1

$$\frac{1}{e-1}x^{e-1}+C \tag{1}$$

Q2

$$\frac{2\pi}{2^{420}}\times\binom{420}{210} \tag{2}$$

where $\binom{a}{b}$ means a "choose" b, i.e. $\frac{a!}{b!(a-b)!}$

Q5

$$0 \tag{3}$$

Q8

$$\frac{\pi}{9} \tag{4}$$

Q15

$$x-\tan x+\sec x+C \tag{5}$$

Q16

$$\frac{\pi}{2} - \frac{1}{2}\sum_{0}^{\infty} n \ln 1 + \frac{2n+1}{1+n^2} \tag{6}$$

(also could be written as $\frac{\pi}{2} - \frac{1}{2}\sum_{0}^{\infty} n \ln \frac{1+(n+1)^2}{1+n^2}$)

Q17

$$\frac{9\pi}{4} - \frac{8\pi\sqrt{3}}{9} - 2 \tag{7}$$

Q18

$$\sqrt{x - x^2} - \tan^{-1}\left(\sqrt{\frac{1}{x} - 1}\right) + C \tag{8}$$

Q20

$$\frac{1}{2}x\sqrt{x^2 - 1} - \ln|x + \sqrt{x^2 - 1}| + C \tag{9}$$

1 Q24

$$x - \sin^{-1}(x)\sqrt{1 - x^2} + C \tag{10}$$

Q31

$$2 - \frac{\pi^2}{6} \tag{11}$$

Q35

$$e - 1 \tag{12}$$

Q37

$$0 \tag{13}$$

Q39

$$\frac{1}{\sqrt{2}} \tan^{-1}\left(\frac{\tan x - \cot x}{2}\right) + C \tag{14}$$