Subject: Mathematics

Chapter: Indefinite Integrals

Topic: Indefinite Integrals

Sub-Topic: Integral of product of integral power of tan x and integral power of sec x

Question:

| Column - If(x) | Column - II∫f(x)dx |
| --- | --- |
| a. | 1 a2+b2−a2−b2cos⁡x |
| b. | 1 a2sin2⁡x+b2cos2⁡x |
| c. | 1 acos⁡x+bsin⁡x |
| d. | 1 a2−b2cos2⁡x |

Options :

1)

A-s; B-r; C-p; D-q

2)

A-p; B-r; C-s; D-q

3)

A-p; B-q; C-r; D-s

4)

A-r; B-p; C-s; D-q

HINT:

Ans:

1

Solution:

(1)

(2)

(3)

(4)

solution:

I = Integral of 1 divided by (a power 2 plus b power 2 minus a power 2 minus b power 2 multiplied by cos(x)) dx

= Integral of 2 dt divided by (1 plus t power 2), where tan(x divided by 2) equals t

= 2 Integral of dt divided by (a power 2 plus b power 2 plus t power 2 minus a power 2 minus b power 2 multiplied by t power 2)

= Integral of dt divided by (a power 2 plus b power 2 multiplied by (1 minus t power 2))

= (1 divided by (a multiplied by b)) multiplied by tan power -1 (a multiplied by t divided by b) plus C

Integral of (1 divided by (a power 2 multiplied by sin power 2(x) plus b power 2 multiplied by cos power 2(x))) dx

= Integral of (x divided by (b power 2 plus a power 2 multiplied by tan power 2(x))) dx

= Integral of dt divided by (b power 2 plus a power 2 multiplied by t power 2), where tan(x) equals t

= (1 divided by (a multiplied by b)) multiplied by tan power -1 (a multiplied by t divided by b) plus C

I = Integral of (1 divided by (a multiplied by cos(x) plus b multiplied by sin(x))) dx

= (1 divided by square root of (a power 2 plus b power 2)) multiplied by Integral of (1 divided by sin(theta plus x)) dx

= (1 divided by square root of (a power 2 plus b power 2)) multiplied by log absolute value of (tan((theta plus x) divided by 2)) plus C

= (1 divided by square root of (a power 2 plus b power 2)) multiplied by log absolute value of (tan(x divided by 2 plus theta divided by 2)) plus C

Integral of (x divided by (a power 2 plus tan power 2(x) minus b power 2)) dx

= Integral of dt divided by (a power 2 plus t power 2 minus b power 2), where tan(x) equals t

= (1 divided by a power 2) multiplied by sin power -1 ((a divided by b) multiplied by sin(x)) plus C

Note: In the last integral, alpha (α) represents cos power -1 (b divided by a).