Chapter 3 <u>Anti-Derivatives</u>

1) The anti derivative of the function f(y) = secy tan y is

A) sec y tan y
B) $\sec^2 y$
C) secy + c
D) tany

Answer: C

2) The anti derivative of zero is

A) 1
B) 0
C) x
D) constant

Answer: D

3) The anti derivative of the function f(y) = 4^y is

A) $4^{y+1} + C$
B) $4^y \, l_n 4$
C) $\frac{4^y}{l_n 4} + C$
D) $4^y + C$

Answer: C

4) The anti derivative of the function
f(y) = $\tan^2 y \operatorname{cosec}^2 y$ is

A) $\tan^2 y + c$
B) tany + c
C) $\operatorname{cosec}^2 y + c$
D) cosecy + c

Answer: B

5) The anti derivative of the function f(z) = $(3z - 8)^5$ is

A) $\frac{(3z-8)^6}{6} + c$
B) $\frac{(3z-8)^6}{12} + c$
C) $\frac{(3z-8)^6}{18} + c$
D) $6(3z-8)^6 + c$

Answer: C

6) The value of $\int \frac{4y^3 - 4y}{y^4 - 2y^2 + 3} dy$ is

A) $l_n(y^3 - 4y) + c$
B) $l_n(y^4 - 2y + 3) + c$
C) $l_n(y^4 - 2y^2 + 3) + c$
D) $l_n(4y^3 - 4y) + c$

Answer: C

7) The value of $\int \frac{1}{y l_n y} dy$ is

A) $l_n |y| + c$
B) $l_n \frac{1}{y} + c$
C) $\frac{1}{y} + c$
D) $l_n[l_n |y|] + c$

Answer: D

8) The value of $\int \frac{\sec^2 y}{\tan 45^o} dy$ is

A) $l_n |\tan y| + c$
B) $l_n |\tan 45^o| + c$
C) tan y + c
D) sec y + c

Answer: C

9) The anti derivative of the function f(y) = y tan 45° is

A) $\sec^2 45^o + C$
B) $y \sec^2 45^o$
C) $\frac{y^2}{2} \sec^2 45^o$
D) ½ y^2 + c

Answer: D

10) The value of $\int (\tan 45^o) \sec^2 y \, dy$ is

A) $\frac{(\tan 45^o)^4}{4} + c$
B) $\frac{(\tan 45^o)^4}{4}$
C) $\frac{(\tan 45^o)^4}{4} \tan y + c$
D) Tan y + c

Answer: D

11) The value of $\int (\cot 45^o)^5 \cos ec^2 y \, dy$

A) $\frac{(\cot 45^o)^5}{6}$
B) $-\frac{(\cot 45^o)^6}{6} + c$
C) $\frac{(\cot 45^o)^6}{6} + c$
D) – cot y + c

Answer: D

12) The value of $\int (\sin\alpha)^3 \cos x\, dx$ is

A) $\frac{(\sin\alpha)^4}{4}$

B) $\frac{(\sin\alpha)^4}{4} + c$

C) $\frac{(\sin\alpha)^3}{3} + c$

D) $(\sin\alpha)^3 \sin x + c$

Answer: D

13) The value of $\int \sin x \ \cos\alpha\, dx$

A) $\frac{(\sin x)^2}{2}$

B) $\frac{(\sin x)^2}{2} + c$

C) $-\cos x \cos\alpha + c$

D) $\cos x \cos\alpha + c$

Answer: C

14) the value of $\int \sec^3 \alpha\, dy$ is

A) tan α + c

B) – tan α + c

C) y $\sec^2$ α + c

D) y tanα + c

Answer: C

15) The value of $\int \operatorname{cosec}^2 a\ dx$ is

A) – cot a + c

B) cot a + c

C) x cot a + c

D) x cosec^2 a + c

Answer: D

16) The value of $\int \frac{\cot x \cot 45^o}{l_n \sin x} dx$ is

A) l_n sinx + c

B) l_n cotx + c

C) l_n (l_n sinx) + c

D) – l_n (l_n cotx) + c

Answer: C

17) The value of $\int \tan^2 y \sec^2 y\ dy$ is

A) $\frac{(\tan y)^3}{3} + c$

B) $\frac{(\tan y)^2}{2} + c$

C) $\frac{(\tan y)^3}{4} + c$

D) $\frac{1}{2}(\tan y)^3 + c$

Answer: A

18) The value of $\int (y^2 + y + 5)^4 (2y+1)\ dy$

A) $\frac{y^3}{3} + \frac{y^2}{2} + 5y + c$

B) $\frac{(y^2 + y + 5)^4}{4}(y^2 + y) + c$

C) $\frac{(2y = 1)^5}{5} + c$

D) $\frac{(y^2 + y + 5)^5}{5} + c$

Answer: D

19) The partial fraction of $\frac{2x-1}{x(x-1)}$ are

A) $\frac{Ax+b}{x^2 - x}$

B) $\frac{A}{x} + \frac{B}{x-1}$

C) $\frac{A}{x} - \frac{B}{x-1}$

D) $\frac{A}{x-1} - \frac{B}{x}$

Answer: B

20) In the form of partial fractions the rational function $\frac{(3x^2-1)(2x+1)}{(x-1)(x^2+1)}$ can be written as

A) $\frac{A}{x-1} + \frac{B}{x^2+1}$

B) $\frac{A}{x-1} - \frac{B}{x^2+1}$

C) $\frac{A}{x-1} + \frac{Bx}{x^2+1}$

D) $\frac{A}{x-1} + \frac{Bx+c}{x^2+1}$

Answer: D

21) In the form of partial fractions the rational function $\frac{x^3 + x^2 + 2x + 3}{(x^2+1)(x^2+2)}$ can be written as

A) $\frac{A}{x^2+1}+\frac{B}{x^2+2}$

B) $\frac{Ax+B}{x^2+1}+\frac{Cx+D}{x^2+2}$

C) $\frac{Ax-B}{x^2+1}+\frac{Cx-D}{x^2+2}$

D) $\frac{A+B}{x^2+1}+\frac{C+D}{x^2+2}$

Answer: B

22) In the form of partial fraction the rational function $\frac{x^2+2x}{(x+1)^2(x^2+1)}$ can be written as

A) $\frac{A}{x+1}+\frac{B}{x^2+1}$

B) $\frac{A}{x+1}+\frac{Bx+C}{x^2+1}$

C) $\frac{A}{(x+1)^2}+\frac{Bx+C}{x^2+1}$

D) $\frac{A}{x+1}+\frac{B}{(x+1)^2}+\frac{Cx+D}{x^2+1}$

Answer: D

23) The value of $\int \frac{dx}{(x+2)^2+4}$ is

A) $Tan^{-1}(x+2)$

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

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

D) $\frac{1}{4}Tan^{-1}\left(\frac{x+2}{4}\right)+C$

Answer: C

24) The value of $\int \frac{dx}{x^2-1}$ is

A) $l_n\left|\frac{x-1}{x+1}\right|+C$

B) $l_n\left|\frac{x+1}{x-1}\right|+C$

C) $\frac{1}{2}l_n\left|\frac{x+1}{x-1}\right|+C$

D) $\frac{1}{2}l_n\left|\frac{x-1}{x+1}\right|+C$

Answer: D

25) The value of $\int \frac{dx}{4-x^2}$ is

A) $l_n\left|\frac{2-x}{2+x}\right|+C$

B) $l_n\left|\frac{2+x}{2-x}\right|+C$

C) $\frac{1}{4}l_n\left|\frac{2+x}{2-x}\right|+C$

D) $\frac{1}{4}l_n\left|\frac{2-x}{2+x}\right|+C$

Answer: C

26) The value of $\int \frac{1+\cos x}{x+\sin x}dx$ is

A) $l_n\left|x+\sin x\right|+C$

B) $x+\sin x+C$

C) $l_n\left|x+\cos x\right|+C$

D) $l_n\left|\sin x+\cos x\right|+C$

Answer: A

27) The indefinite integral of the function $f(y)=\frac{2y}{y^2+1}$ is

A) y^3 y + C

B) $\frac{y^3}{3}+y$

C) y^2 + C

D) $l_n\left|y^2+1\right|+C$

Answer: D

7. Integration by Substitution

1) The indefinite integral of $f(y)=\frac{e^y}{1+e^{2y}}$ is

A) $l_n\left|1+e^{2y}\right|+C$

B) e^y+C

C) $Tan^{-1}e^y+C$

D) $Cot^{-1}e^y+C$

Answer: C

2) The indefinite integral of f(x) = l_n x is

A) $\frac{1}{x}+c$

B) $\frac{l_n x}{x} + c$

C) l_n x – x + c

D) x l_n x – x + c

Answer: D

3) The anti derivative of $f(y) = e^y\left(\cos^{-1} y - \frac{1}{\sqrt{1-y^2}}\right)$ is

A) $e^y Sin^{-1} y + c$

B) $e^y Cos^{-1} y + c$

C) $-e^y Cos^{-1} y + c$

D) $-e^y Sin^{-1} y + c$

Answer: B

4) The value of $\int e^y\left(\sec^{-1} y + \frac{1}{y\sqrt{y^2-1}}\right)dy$ is

A) $e^y Co\sec^{-1} y + c$

B) $-e^y Co\sec^{-1} y + c$

C) $e^y Sec^{-1} y + c$

D) $-e^y Sec^{-1} y + c$

Answer: C

5) The anti derivative of $f(x) = e^x\left(Co\sec^{-1} x - \frac{1}{x\sqrt{x^2-1}}\right)$ is

A) $e^x Sec^{-1} x + c$

B) $e^x Co\sec^{-1} x + c$

C) $-e^x Sec^{-1} x + c$

D) $-e^x Co\sec^{-1} x + c$

Answer: B

6) The value of $\int e^y (y^3 + 3y^2)\, dy$ is

A) $e^y\left(\frac{y^4}{4} + y^3\right) + c$

B) $e^y\left(y^4 + y^3\right) + c$

C) $e^y y^3 + c$

D) $3e^y y^2 + c$

Answer: C

7) The anti derivative of $f(x) = e^x x^3 + 3e^x x^2$ is

A) $e^x \frac{x^4}{4} + e^x x^3 + c$

B) $e^x x^4 + 3e^x x^2$

C) $e^x \frac{x^4}{4} + 3e^x x^3 + c$

D) $e^x x^3 + c$

Answer: D

8) The value of $\int\left(e^z Cosz - e^z Sinz\right)dz$ is

A) $-e^z \sin z + c$

B) $e^z \cos z + c$

C) $-e^z \cos z + c$

D) $e^z \sin z + c$

Answer: B

9) The definite integral of $f(y) = e^y Coty - e^y Co\sec^2 y$ is

A) $e^y Co\sec^2 y + c$

B) $-e^y Co\sec^2 y + c$

C) $-e^y \tan y + c$

D) $e^y \cot y + c$

Answer: D

10) The anti derivative of $f(z) = e^z Secz + e^z Secz \tan z$ is

A) e^z Cosecz + c

B) e^z secz + c

C) – e^z secz tanz + c

D) e^z Secz tan z + c

Answer: B

11) The value of $\int\left(e^y Co\sec y - e^y Co\sec y Coty\right)dy$ is

A) e^y Cosecy Coty + c

B) – e^y Cosecy Coty + c

C) e^y Cosec y + c

D) – e^y Cosecy + c

Answer: C

12) The value of $\int_{\frac{\pi}{4}}^{\frac{\pi}{4}}\left(Sec^2 y + Co\sec^2 y\right)dy$ is

A) 0

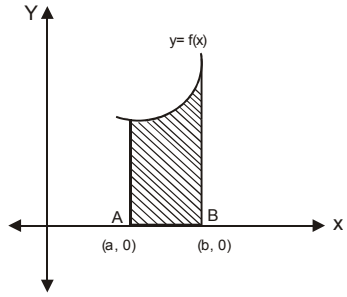
B) $Tan\frac{\pi}{4}$

C) 1

D) $-Cot\frac{\pi}{4}$

Answer: A

13) The shaded area in the figure can be represented by



A) $\int_0^a f(x)\ dx$

B) $\int_0^b f(x)\ dx$

C) $\int_b^a f(x)\ dx$

D) $\int_a^b f(x)\ dx$

Answer: D

14) The value of $\int_3^3 (x^3+3x^2+2x+1)\ dx$ is

A) 27
B) 54
C) 52
D) 0

Answer: D

15) The value of $\int_1^3 (z^5+4z^4+z^3)\,dz$ is

A) 1
B) 243
C) 324
D) $-\int_3^1 (z^5+4z^4+z^3)\,dz$

Answer: D

16) The value of $\int_0^{\frac{\pi}{3}} \sin y\ dy$ is

A) 0
B) 1
C) $\frac{\sqrt{3}}{2}$
D) $-\int_{\frac{\pi}{3}}^0 \sin y\ dy$

Answer: D

17) The value of $\int_0^{\frac{\pi}{4}} \tan y \sec^2 y\ dy$ is

A) 0
B) 1
C) – 1
D) $-\int_{\frac{\pi}{4}}^0 \tan y \sec^2 y\ dy$

Answer: D

18) The value of $\int_1^3 (x^2+2x)^5\,dx + \int_3^5 (y^2+2y)^5\,dy$ is

A) $\int_1^5 (x^2+2x)^5\,dx$

B) $\int_3^5 (y^2+2y)^5\,dy$

C) $\int_1^3 (y^2+2y)^5\,dy$

D) $\int_1^5 (y^2+2y)^6\,dy$

Answer: A

19) The value of $\int_0^2 (y^3+3y^2)^6\,dy + \int_2^4 (z^3+3z^2)^6\,dz$ is

A) 204
B) 364
C) $\int_0^4 (z^3+3z^2)^6\,dz$
D) ¾

Answer: C

20) If f and g are continuous functions and $\int_1^3 f(y)\,dy = 8, \int_3^7 f(z)\,dz = 9$ then the value of $\int_1^7 f(z)\,dz$ is

A) 7
B) 1
C) 6
D) 17

Answer: D

21) IF f and g are continuous functions on (a, b), s.t. $\int_a^b f(x)\,dx = 12$ *and* $\int_a^b g(x)\,dx = 5$ then the value of $\int_a^b [f(x) - g(x)]\,dx$ is

A) 7ab
B) 7(a – b)
C) 7(b – a)
D) 7

Answer: D

22) If f and g are continuous functions on (1, 5), such that $\int_1^5 f(y)\,dy = 5$ *and* $\int_1^5 g(y)\,dy = 3$ then the value of $\int_1^5 [f(y) + g(y)]\,dy$ is

A) 6
B) 8
C) 4
D) 2

Answer: B

23) If $\int_2^5 f(x)\ dx = 5$ then the value of $\int_2^5 5f(y)\ dy$ is

A) 5
B) 3
C) 25
D) 10

Answer: C

24) If $\int_1^3 f(x)\ dx = 4$ then the value of $\int_3^1 f(y)\ dy$ is

A) 2
B) – 2
C) 3
D) – 4

Answer: D

25) The solution of the equation $\frac{dy}{dx} = 2x$ is

A) y = 2x
B) $y = x^2 + c$
C) $y = 2x^2 + c$
D) $y = 3x^2 + c$

Answer: B

26) Let f be continuous on (1, 7) and $\int_1^7 f(x)\ dx = 9$, $\int_1^7 f(y)\ dy = 19$ then the value of $\int_3^7 f(z)\ dz$ is

A) 10
B) 28
C) 7
D) 4

Answer: A

27) The solution of $\frac{dy}{dx} = \frac{x}{y}$ is

A) $x^2 + c$
B) $y^2 = x^2 + c$
C) $y^2 = x + 2c$
D) $y^2 = 2x$

Answer: B

28) If the acceleration of a particle is given by z = 2t, then its velocity at any time t is:

A) $2t^2 + c$
B) $3t^2 + c$
C) $t^2 + c$
D) 2

Answer: C

29) If the velocity of a particle moving in a straight line is given by $v = 3t^2$ then the distance traveled by it in the first T seconds is

A) $3t^2 + c$
B) $t^3 + c$
C) $3t^2 + c$
D) $T^3 + c$

Answer: D

30) The solution of $\frac{dy}{dx} = \frac{1}{x}$ is

A) $y = x^2 + c$
B) $y = l_n |Cx|$
C) $y = l_n \left|1/x\right|$
D) $y = \frac{1}{x} + c$

Answer: B