

Date Planned : __ / __ / __	Daily Tutorial Sheet - 6	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	Level - 1	Exact Duration : _____

77. If polynomials P and Q satisfy $\int [(3x-1)\cos x + (1-2x)\sin x] dx = P \cos x + Q \sin x$ (ignore the constant of integration) then:
(A) $P = 3x - 2$ **(B)** $Q = 2 + x$ **(C)** $P = 3(x-1)$ **(D)** $Q = 3(x-1)$
78. $\int \frac{\sin^2 x}{\cos^6 x} dx$ is a:
(A) Polynomial of degree 5 in $\sin x$ **(B)** Polynomial of degree 4 in $\tan x$
(C) Polynomial of degree 5 in $\tan x$ **(D)** Polynomial of degree 5 in $\cos x$
79. If $\int \frac{3\cos x + 2\sin x}{4\sin x + 5\cos x} dx = Ax + B \log |4\sin x + 5\cos x| + C$, then:
(A) $A = \frac{23}{41}, B = \frac{1}{41}$ **(B)** $A = \frac{23}{41}, B = \frac{2}{41}$ **(C)** $A = \frac{11}{23}, B = \frac{2}{23}$ **(D)** $A = \frac{12}{23}, B = \frac{2}{23}$
80. If $\int \frac{x dx}{x^2 - 4x + 8} = k \log(x^2 - 4x + 8) + \tan^{-1}\left(\frac{x-2}{2}\right) + C$, then the value of k is:
(A) $1/2$ **(B)** 1 **(C)** 2 **(D)** None of these
81. The value of $\int \frac{e^x}{x+2} [1 + (x+2) \ln(x+2)] dx$ is:
(A) $\frac{e^x}{x+2} \log(x+2) + C$ **(B)** $e^x (x+2) \log(x+2) + C$
(C) $e^x \ln(x+2) + C$ **(D)** None of these
82. The value of $\int \frac{dx}{\sin^6 x}$ is:
(A) $-\frac{\cot^5 x}{5} - 2\frac{\cot^3 x}{3} - \cot x + C$ **(B)** $\frac{\cot^5 x}{5} + 2\frac{\cot^3 x}{3} - \cot x + C$
(C) $-\frac{\cot^3 x}{5} - 2\frac{\cot^5 x}{3} - \cot x + C$ **(D)** None of these
83. $\int \sqrt{1 + \sec x} dx$ is equal to:
(A) $2 \tan^{-1} \sqrt{\frac{1 - \cos x}{\cos x}} + C$ **(B)** $\tan^{-1} \sqrt{\frac{1 - \cos x}{\cos x}} + C$
(C) $3 \tan^{-1} \sqrt{\frac{1 + \cos x}{\cos x}} + C$ **(D)** None of these
84. The value of $\int \frac{1}{(2ax + x^2)^{3/2}} dx$ is:
(A) $\frac{1}{a} \frac{2x+a}{\sqrt{x^2+2ax}} + c$ **(B)** $\frac{-1}{a^2} \frac{x+a}{\sqrt{x^2+2ax}} + c$ **(C)** $\frac{-1}{a^3} \frac{2x+a}{\sqrt{x^2+2ax}} + c$ **(D)** None of these

85. The value of $\int \frac{\log \left[x + \sqrt{1+x^2} \right]}{\sqrt{1+x^2}} dx$ is:
- (A) $\left[\log \left(x + \sqrt{1+x^2} \right) \right]^2$ (B) $\frac{1}{4} \left[\log \left(x + \sqrt{1+x^2} \right) \right]$ (C) $\frac{1}{2} \left[\log \left(x + \sqrt{1+x^2} \right) \right]^2$ (D) None of these
86. The value of $\int \frac{2 - \sin x}{2 \cos x + 3} dx$ is:
- (A) $\frac{4}{\sqrt{5}} \tan^{-1} \left(\frac{1}{\sqrt{5}} \tan \frac{x}{2} \right) + \frac{1}{2} \log (2 \cos x + 3) + C$
- (B) $\frac{4}{\sqrt{5}} \tan^{-1} \left(\frac{1}{\sqrt{5}} \cos \frac{x}{2} \right) + \frac{1}{2} \log (2 \cos x + 3) + C$
- (C) $\frac{4}{\sqrt{5}} \tan^{-1} \left(\frac{1}{\sqrt{5}} \tan \frac{x}{2} \right) + (2 \cos x + 3) + C$
- (D) None of these
87. Evaluate: $\int \frac{f(x)}{x^3 - 1} dx$ where $f(x)$ is a polynomial of second degree in x such that $f(0) = f(1) = 3f(2) = -3$.
- (A) $-\log(x-1) + \log(x^2 + x + 1) + \frac{2}{\sqrt{3}} \tan^{-1} \frac{2x+1}{\sqrt{3}} + k$
- (B) $\log(x-1) + \log(x^2 + x + 1) + \frac{2}{\sqrt{3}} \tan^{-1} 2x + k$
- (C) $\log(x+1) + \log(x^2 + x + 1) + k$
- (D) None of these
88. Evaluate: $\int \frac{x^3 - 1}{x^3 + x} dx$
- (A) $x - \log x + \frac{1}{2} \log(x^2 + 1) - \tan^{-1} x + c$ (B) $x + \log x + \log(x+1)^2 - \tan^{-1} x + c$
- (C) $\log x + \frac{1}{2} \log(x^2 + 1) - \tan^{-1} x + c$ (D) None of these
89. The value of $\int \sin^{-1} \sqrt{\frac{x}{a+x}} dx$ is:
- (A) $(a+x) \tan^{-1} \sqrt{\frac{x}{a}} + C$ (B) $(a) \sin^{-1} \sqrt{\frac{x}{a}} - \sqrt{ax} + C$
- (C) $(a+x) \tan^{-1} \sqrt{\frac{a}{x}} - \sqrt{\frac{a}{x}} + C$ (D) $(a+x) \tan^{-1} \sqrt{\frac{x}{a}} - \sqrt{ax} + C$
90. If $f(x) = \int \frac{2 \sin x - \sin 2x}{x^3} dx, x \neq 0$ then $\lim_{x \rightarrow 0} f'(x)$ is equal to:
- (A) 0 (B) 1 (C) 2 (D) $\frac{1}{2}$