Mixed Integration Class work

1) $\int_1^2 \frac{x+1}{x^2+2x}dx =$

(A) $ln\left(\frac{8}{3}\right)$ (B) $\frac{1}{2}ln\left(\frac{8}{3}\right)$

(C) $\ln 8$ (D) $\frac{3ln2}{2}$ (E) $\frac{3ln2+2}{2}$

2) $\int_{15}^{20} \frac{x}{\sqrt{625-x^2}}dx =$

3) $\int \frac{4x^2+x-9}{x^3+2x^2-3x}dx =$

4) $\int \frac{xdx}{(x-3)^{2/3}} =$

5) $\int (x^2+3)cos(2x)dx =$

6) $\int \frac{1}{1-e^{-x}}dx =$

7) $\int e^{2x} sin(2x)dx =$

8) $\int sec\left(\frac{x}{3}\right)tan\left(\frac{x}{3}\right)dx =$

9) $\int \frac{5dx}{\sqrt{5+3x-2x^2}} =$

10) $\int cos^2(3x)dx =$

11) $\int \frac{1}{csc\,x-1}dx =$

Mixed Integration Class work

1) $\int_1^2 \frac{x+1}{x^2+2x}dx =$

(A) $ln\left(\frac{8}{3}\right)$ (B) $\frac{1}{2}ln\left(\frac{8}{3}\right)$

(C) $\ln 8$ (D) $\frac{3ln2}{2}$ (E) $\frac{3ln2+2}{2}$

2) $\int_{15}^{20} \frac{x}{\sqrt{625-x^2}}dx =$

3) $\int \frac{4x^2+x-9}{x^3+2x^2-3x}dx =$

4) $\int \frac{xdx}{(x-3)^{2/3}} =$

5) $\int (x^2+3)cos(2x)dx =$

6) $\int \frac{1}{1-e^{-x}}dx =$

7) $\int e^{2x} sin(2x)dx =$

8) $\int sec\left(\frac{x}{3}\right)tan\left(\frac{x}{3}\right)dx =$

9) $\int \frac{5dx}{\sqrt{5+3x-2x^2}} =$

10) $\int cos^2(3x)dx =$

11) $\int \frac{1}{csc\,x-1}dx =$

Mixed Integration Class Work

B ① $\int_1^2 \frac{x+1}{x^2+2x}\,dx$

$u = x^2+2x$

$du = 2x+2$

$\frac{1}{2}du = x+1\,dx$

$\frac{1}{2}\int \frac{1}{u}\,du$

$\frac{1}{2}\ln|x^2+2x|\Big]_1^2$

$\frac{1}{2}\ln|4+4| - \frac{1}{2}\ln|1+2|$

$\frac{1}{2}\left[\ln 8 - \ln 3\right]$

$\frac{1}{2}\ln\frac{8}{3}$

3. $\int \frac{4x^2+x-9}{x(x+3)(x-1)}$

$\frac{4x^2+x-9}{x(x+3)(x-1)} = \frac{A}{x} + \frac{B}{x+3} + \frac{C}{x-1}$

$4x^2+x-9 = A(x+3)(x-1) + Bx(x-1) + Cx(x+3)$

$x=1 \quad -4 = 4C$

$-1 = C$

$x=0 \quad -9 = -3A$

$3 = A$

$x=-3 \quad 30-3-9 = 12B$

$24 = 12B$

$2 = B$

$\int \frac{3}{x} + \frac{2}{x+3} - \frac{1}{x-1}$

$3\ln|x| + 2\ln|x+3| - 1\ln|x-1| + C$

5. $\int (x^2+3)\cos 2x\,dx$

$\int \cos 2x$

$u = 2x$

$du = 2\,dx$

$\frac{1}{2}du = dx$

u	dv	
x^2+3	$\cos 2x$	1
$2x$	$\frac{1}{2}\sin 2x$	-1
2	$-\frac{1}{4}\cos 2x$	1
0	$-\frac{1}{8}\sin 2x$	-1
		1

$\frac{1}{2}(x^2+3)\sin 2x + \frac{1}{2}x\cos 2x - \frac{1}{4}\sin 2x + C$

$\frac{x^2}{2}\sin 2x + \frac{6}{4}\sin 2x + \frac{x}{2}\cos 2x - \frac{1}{4}\sin 2x + C$

$\frac{x^2}{2}\sin 2x + \frac{5}{4}\sin 2x + \frac{x}{2}\cos 2x + C$

7. $\int e^x \sin 2x\,dx$ $\quad u = e^x \quad dv = \sin 2x$

$du = e^x \quad v = -\frac{1}{2}\cos 2x$

$\int e^x \sin 2x\,dx = -\frac{1}{2}e^x \cos 2x + \frac{1}{2}\int e^x \cos 2x$

$u = e^x \quad dv = \cos 2x$

$du = e^x \quad v = \frac{1}{2}\sin 2x$

$= -\frac{1}{2}e^x \cos 2x + \frac{1}{2}\left[\frac{1}{2}e^x \sin 2x - \int \frac{1}{2}e^x \sin 2x\right]$

$\int e^x \sin 2x = -\frac{1}{2}e^x \cos 2x + \frac{1}{4}e^x \sin 2x - \frac{1}{4}\int e^x \sin 2x$

$\frac{5}{4}\int e^x \sin 2x = -\frac{1}{2}e^x \cos 2x + \frac{1}{4}e^x \sin 2x$

$5\int e^x \sin 2x = -2e^x \cos 2x + e^x \sin 2x$

$\int e^x \sin 2x = \frac{-2e^x \cos 2x + e^x \sin 2x}{5}$

9. $\int \frac{5\,dx}{\sqrt{-2x^2+3x+5}}$

$5\int \frac{dx}{\sqrt{-2\left(x^2-\frac{3}{2}x+\frac{9}{16}\right)+5+\frac{9}{8}}}$

$5\int \frac{dx}{\sqrt{-2\left(x-\frac{3}{4}\right)^2+\frac{49}{8}}}$

$5\int \frac{dx}{\sqrt{\frac{49}{8}-2\left(x-\frac{3}{4}\right)^2}}$

$5\int \frac{dx}{\sqrt{2\left(\frac{49}{16}-\left(x-\frac{3}{4}\right)^2\right)}}$

$\frac{5}{\sqrt{2}}\int \frac{dx}{\sqrt{\left(\frac{49}{16}-\left(x-\frac{3}{4}\right)^2\right)}}$

$\frac{5}{\sqrt{2}}\left(\frac{1}{\frac{7}{4}}\arcsin\frac{x-\frac{3}{4}}{\frac{7}{4}}\right)$

$\frac{5}{\sqrt{2}}\arcsin\frac{4\left(x-\frac{3}{4}\right)}{7}+C$

11. $\int \frac{1}{\csc x - 1}\, dx$

$\int \frac{1}{\csc x - 1} \cdot \frac{\csc x + 1}{\csc x + 1}\, dx$

$\int \frac{\csc x + 1}{\csc^2 x - 1}$

$\int \frac{\csc x}{\cot^2 x} + \frac{1}{\cot^2 x}\, dx$

$\frac{1}{\sin x} \cdot \frac{\sin^2 x}{\cos^2 x}$ $\qquad$ $\frac{\sin^2 x}{\cos^2 x}$

$\int \frac{\sin x}{\cos^2 x}\, dx$ $\qquad$ $\tan^2 x$ $\qquad$ $1 + \tan^2 x = \sec^2 x$

$\int \cos^{-2} x \sin x\, dx$ $\qquad$ $\int \sec^2 x - 1\, dx$

$u = \cos x$

$-du = \sin x\, dx$

$-\frac{\cos^{-1} x}{-1}$ $\qquad$ $\tan x - x$

$\frac{1}{\cos x}$

$\sec x + \tan x - x + C$