Revision Sheet : Integration

6TH YR. H.L

Q1. Integrate the following: (* include constant c in answers)

i) $\int \sqrt{x}\,.dx$ $\boxed{\frac{2}{3}x^{3/2}}$ ii) $\int e^{-2x}.dx$ $\boxed{-\frac{1}{2}e^{-2x}}$ iii) $\int \frac{1}{x^3}.dx$ $\boxed{\frac{-1}{2x^2}}$

iv) $\int \sin 5x\,.dx$ v) $\int 2x^3.dx$ $\boxed{\frac{1}{2}x^4}$ vi) $\int \frac{x^3-2}{x^2}.dx$ $\boxed{\frac{1}{2}x^2+\frac{2}{x}}$

vii) $\int (1+\sqrt{x})^2.dx$ $\boxed{x+\frac{4}{3}x^{3/2}+\frac{1}{2}x^2}$

Q2. Integrate the following:

i) $\int_1^2 \frac{1}{x}.dx$ $\boxed{\log_e 2}$ ii) $\int_0^{\pi/4} \cos 2x\,.dx$ $\boxed{\frac{1}{2}}$

iii) $\int_2^7 \frac{2x-4}{x^2-4x+29}.dx$ $\boxed{\log_e 2}$ iv) $\int_2^3 \frac{x-2}{x^2-4x+5}.dx$ $\boxed{\log_e \sqrt{2}}$

v) $\int_1^4 \frac{2x+1}{x^2+x+1}.dx$ $\boxed{\log_e 7}$ vi) $\int_0^1 \frac{2x}{\sqrt{1+x^2}}.dx$ $\boxed{2\sqrt{2}-2}$

vii) $\int_0^{\frac{\pi}{3}} \sin x.\cos^3 x\,.dx$ $\boxed{15/64}$ viii) $\int_0^4 \frac{x+4}{\sqrt{x^2+8x+1}}.dx$ $\boxed{6}$

Q3. Integrate the following:

i) $\int_0^{\frac{\pi}{4}} \sin 5\theta.\cos 3\theta.d\theta$ $\boxed{1/4}$ ii) $\int_0^{\frac{\pi}{6}} 2.\cos 4\theta.\cos 2\theta.d\theta$ $\boxed{\sqrt{3}/4}$

iii) $\int_0^{\frac{\pi}{6}} \cos^2 3\theta.d\theta$ $\boxed{\pi/12}$ iv) $\int_0^{1/3} \frac{1}{1+9x^2}.dx$ $\boxed{\pi/12}$

v) $\int_0^{\ln\sqrt{3}} \frac{e^x}{1+e^{2x}}.dx$ $\boxed{\pi/12}$ vi) $\int_1^2 \frac{1}{\sqrt{3+2x-x^2}}.dx$ $\boxed{\pi/6}$

vii) $\int_0^1 3x^2.e^{x^3}.dx$ $\boxed{e-1}$ viii) $\int_{-3}^0 (x+3)e^{x(x+6)}.dx$ $\boxed{\frac{1}{2}(1-1/e^9)}$

Q4. Find the area of the region enclosed by the curve $y = \frac{2x}{x^2+1}$, the X-axis, the line $x=1$ and the line $x=2\sqrt{2}$

$\boxed{\log_e 9/2}$