Exercise 7: Integrations

Topic 7.1 : Indefinite & Definite Integral

1. Evaluate the following integrals

a) $\int x^7 dx$ b) $\int \frac{1}{x} dx$ c) $\int \frac{1}{\sqrt{x}} dx$

d) $\int \frac{1}{x^3} dx$ e) $\int \frac{2}{x+3} dx$ f) $\int x^{\frac{1}{3}} dx$

g) $\int 5\sin x dx$ h) $\int 2e^{2x} dx$ i) $\int 2e^{2x} dx$

[Ans: (a) $\frac{x^8}{8}+C$, (b) $\ln x+C$, (c) $2\sqrt{x}+C$, (d) $-\frac{1}{2x^2}+C$,
(e) $2\ln|x+3|+C$, (f) $\frac{3}{4}x^{4/3}+C$ (g) $-5\cos x+C$ (h) $e^{2x}+C$]

2. Evaluate the following integrals

a) $\int\left(x+\frac{3}{x}\right)^2 dx$ b) $\int\left(x^2+2\right)e^{x^3+6x} dx$ c) $\int \frac{4\sqrt{x}-3}{x^2} dx$

d) $\int(6x+2)^{1/3} dx$ e) $\int\left(e^x+e^{-x}\right)^2 dx$ f) $\int \frac{5-x^3}{x^4} dx$

g) $\int \sin\left(x^3\right)3x^2 dx$ h) $\int\left(x^2+3\right)^2 dx$ i) $\int \frac{7}{3-2x} dx$

[Ans: (a) $\frac{x^3}{3}+6x-\frac{9}{x}+C$, (b) $\frac{1}{3}e^{x^3+6x}+C$, (c) $-\frac{8}{\sqrt{x}}+\frac{3}{x}+C$,
(d) $\frac{(6x+2)^{\frac{4}{3}}}{8}+C$, (e) $\frac{e^{2x}}{2}+2x-\frac{e^{-2x}}{2}+C$, (f) $-\frac{5}{3x^3}+\ln x+C$
(g) $-\cos x^3+C$. (h) $\frac{x^5}{5}+2x^3+9x+C$ (i) $-\frac{7}{2}\ln|3-2x|+C$]

3. Evaluate the following integrals

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

[Ans: (a) $\frac{x^5}{5}+\frac{4x^{3/2}}{3}+\frac{3}{x}+C$, (b) $(4+3x)^{8/3}+C$, (c) $\frac{x^3}{3}+8x-\frac{16}{x}+C$]

4. Evaluate the following integrals

a) $\int_1^2 \frac{x^2+1}{\sqrt{x}}dx$ b) $\int_2^3\left(\frac{2}{x}-\sqrt{x}\right)^2 dx$ c) $\int_4^5 \frac{x^2+2x}{x^2}dx$

d) $\int_1^2 (4x+3)^{-3}dx$ e) $\int_{\pi/3}^{\pi} \sec x dx$ f) $\int_2^3 \left(9x^2-9\right)e^{x^3-3x}dx$

g) $\int_1^2 6e^{6x+1}dx$ h) $\int_0^2\left(\frac{x^3}{4}+x\right)dx$ i) $\int_0^2 \frac{e^x+e^{-3x}}{e^x}dx$

[Ans: (a) 2.6912, (b) 0.6240, (c) 1.4463, (d) 1.5719×10^{-3}, (e) -1.3170, (f) 1.970×10^{8} (g) 4.41×10^{5} (h) 3, (i) 2.25]