Prelim Revision **Integration 2**

1(a) $\int \frac{1}{\sqrt{100-x^2}}dx$ (b) $\int \frac{1}{\sqrt{2-x^2}}dx$ (c) $\int \frac{1}{\sqrt{5-x^2}}dx$

(d) $\int \frac{1}{5+x^2}dx$ (e) $\int \frac{2}{16+x^2}dx$ (f) $\int \frac{2}{2+x^2}dx$

(g) $\int \frac{1}{x^2-8x+19}dx$ (h) $\int \frac{1}{x^2+8x+20}dx$

Evaluate, in terms of π:

(i) $\int_0^3 \frac{1}{\sqrt{36-x^2}}dx$ (j) $\int_0^4 \frac{1}{\sqrt{64-x^2}}dx$ (k) $\int_1^{\sqrt{3}} \frac{1}{\sqrt{4-x^2}}dx$

(l) $\int_0^1 \frac{1}{1+x^2}dx$ (m) $\int_{-2}^2 \frac{1}{4+x^2}dx$ (n) $\int_0^{\sqrt{3}} \frac{1}{9+x^2}dx$

2) Use Integration by parts to find

a) $\int x\sin 4x dx$ b) $\int xe^{2x}dx$ c) $\int x(x-1)^4 dx$ d) $\int (2x+3)(2x-1)^5 dx$

3) Use successive integration by parts to find

a) $\int x^2 e^x dx$ b) $\int x^2 \sin 4x dx$ c) $\int x^3 \cos 3x dx$ d) $\int x^3 e^{5x} dx$

Answers

1a) $\sin^{-1}\left(\frac{x}{10}\right)+C$ (b) $\sin^{-1}\left(\frac{x}{\sqrt{2}}\right)+C$ (c) $\sin^{-1}\left(\frac{x}{\sqrt{5}}\right)+C$

(d) $\frac{1}{\sqrt{5}}\tan^{-1}\left(\frac{x}{\sqrt{5}}\right)+C$ (e) $\frac{1}{2}\tan^{-1}\left(\frac{x}{4}\right)+C$ (f) $\sqrt{2}\tan^{-1}\left(\frac{x}{\sqrt{2}}\right)+C$

(g) $\frac{1}{\sqrt{3}}\tan^{-1}\left(\frac{x-4}{\sqrt{3}}\right)+C$ (h) $\frac{1}{2}\tan^{-1}\left(\frac{x+4}{2}\right)+C$

(i) $\frac{\pi}{6}$ (j) $\frac{\pi}{6}$ (k) $\frac{\pi}{6}$ (l) $\frac{\pi}{4}$ (m) $\frac{\pi}{4}$ (n) $\frac{\pi}{18}$

2a) $-\frac{1}{4}x\cos 4x+\frac{1}{16}\sin 4x+C$ b) $\frac{1}{2}xe^{2x}-\frac{1}{4}e^{2x}+C$

c) $\frac{1}{5}x(x-1)^5-\frac{1}{30}(x-1)^6+C$ d) $\frac{1}{12}(2x+3)(2x-1)^6-\frac{1}{84}(2x-1)^7+C$

3a) $x^2e^x-2xe^x+2e^x+C$ b) $-\frac{1}{4}x^2\cos 4x+\frac{1}{8}x\sin 4x+\frac{1}{32}\cos 4x+C$

c) $\frac{1}{3}x^3\sin 3x+\frac{1}{3}x^2\cos 3x-\frac{2}{9}x\sin 3x-\frac{2}{27}\cos 3x+C$

d) $\frac{1}{5}x^3e^{5x}-\frac{3}{25}x^2e^{5x}+\frac{6}{125}xe^{5x}-\frac{6}{625}e^{5x}$