Exercise 8.3

1. Find the following integrals using the suggested substitution.

   (a) $\int x(x^2+2)^3\,dx,\ u = x^2+2$

   (b) $\int 2x(x^2-4)^{\frac{1}{2}}\,dx,\ u = x^2-4$

   (c) $\int x\sqrt{2x^2-5}\,dx,\ u = 2x^2-5$

   (d) $\int \frac{x}{\sqrt{x+9}},\ u = x+9$

   (e) $\int \frac{2x+1}{(x-3)^6}\,dx,\ u = x-3$

   (f) $\int \frac{3x}{\sqrt{4-x}}\,dx,\ u^2 = 4-x$

   (g) $\int \sqrt{1-x^2}\,dx,\ x = \sin\theta$

   (h) $\int \sin^5 x\,dx,\ u = \cos x$

   (i) $\int \sin^4 x\cos x\,dx,\ u = \sin x$

   (j) $\int \frac{1}{4+x^2}\,dx,\ x = 2\tan\theta$

   (k) $\int \frac{x^2+1}{\sqrt{x^3+3x+4}}\,dx,\ u = x^3+3x+4$

   (l) $\int \cos^3 x\sin x\,dx,\ u = \cos x$

   (m) $\int \frac{\sqrt{1+\sqrt{x}}}{\sqrt{x}}\,dx,\ u^2 = x$

   (n) $\int \frac{1}{(9-x^2)^{\frac{3}{2}}}\,dx,\ x = 3\sin\theta$

2. By using a suitable substitution, find the following integrals.

   (a) $\int 2x(1-x)^7\,dx$

   (b) $\int \frac{x}{\sqrt{1-4x^2}}\,dx$

   (c) $\int \frac{x+3}{(4-x)^5}\,dx$

   (d) $\int \frac{1}{\sqrt{9-x^2}}\,dx$

   (e) $\int \frac{x^2}{\sqrt{4-x^2}}\,dx$

   (f) $\int \sin^3 x\,dx$

   (g) $\int \sin^3 x\cos x\,dx$

Exercise 8.3

1. (a) $\frac{(x^2+2)^4}{8}+c$

   (b) $\frac{2}{3}(x^2-4)^{\frac{3}{2}}+c$

   (c) $\frac{1}{6}(2x^2-5)^{\frac{3}{2}}+c$

   (d) $\frac{2}{3}(x+9)^{\frac{1}{2}}(x-18)+c$

   (e) $\frac{1-5x}{10(x-3)^5}+c$

   (f) $-2(8+x)\sqrt{4-x}+c$

   (g) $\frac{1}{2}(\sin^{-1}x + x\sqrt{1-x^2})+c$

   (h) $-\cos x+\frac{2}{3}\cos^3 x-\frac{1}{5}\cos^5 x+c$

   (i) $\frac{1}{5}\sin^5 x+c$

   (j) $\frac{1}{2}\tan^{-1}\frac{x}{2}+c$

   (k) $\frac{2}{3}\sqrt{x^3+3x+4}+c$

   (l) $-\frac{1}{4}\cos^4 x+c$

   (m) $\frac{4}{3}(1+\sqrt{x})^{\frac{3}{2}}+c$

   (n) $\frac{x}{9\sqrt{9-x^2}}+c$

2. (a) $-\frac{1}{36}(8x+1)(1-x)^8$

   (b) $-\frac{1}{4}\sqrt{1-4x^2}+c$

   (c) $\frac{5+4x}{12(4-x)^4}+c$

   (d) $\sin^{-1}(\frac{x}{3})+c$

   (e) $2\sin^{-1}(\frac{x}{2})-\frac{1}{2}x\sqrt{4-x^2}+c$

   (f) $-\cos x+\frac{1}{3}\cos^3 x+c$

   (g) $\frac{\sin^4 x}{4}+c$