INDEFINITE INTEGRALS AND SUBSTITUTION

1 Find: **(a)** $\int 2x\left(x^2-1\right)^4\,dx$ using the substitution $u=x^2-1$

(b) $\int 3x^2\left(x^3+4\right)^3\,dx$ using the substitution $u=x^3+4$

(c) $\int x^2\sqrt{x^3+1}\,dx$ using the substitution $u=x^3+1$.

2 Find: **(a)** $\int (2t+1)^3\,dt$ using the substitution $u = 2t+1$

(b) $\int \frac{2x}{\sqrt{x^2-4}}dx$ using the substitution $u = x^2 - 4$

(c) $\int (2x+1)\left(x^2+x+2\right)^5\,dx$ using the substitution $u = x^2 + x + 2$.

4 Find:

(a) $\int (3-2x)^6\,dx$ using the substitution $u = 3-2x$

(b) $\int \dfrac{3x+1}{\left(3x^2+2x+5\right)^2}\,dx$ using the substitution $u = 3x^2+2x+5$

(c) $\int \left(x^2-2x\right)\left(x^3-3x^2+1\right)^4\,dx$ using the substitution $u = x^3-3x^2+1$.

6 Find: **(a)** $\int 2t\sqrt{1-t^2}\,dt$ using the substitution $u = 1 - t^2$

(b) $\int x\sqrt{a^2 - x^2}\,dx$ using the substitution $u = a^2 - x^2$

(c) $\int z\sqrt[3]{z^2+1}\,dz$ using the substitution $u = z^2 + 1$.

7 Find: **(a)** $\int y\sqrt{y+1}\,dy$ using the substitution $u = y + 1$

(b) $\int \frac{x}{(x-1)^3}dx$ using the substitution $u = x - 1$

(c) $\int \frac{x}{\sqrt{2x-1}}dx$ using the substitution $u = 2x - 1$.

11 $\frac{dx}{dt} = \frac{t-1}{\sqrt{t^2-2t+4}}$ and $x = 10$ when $t = 0$. Use the substitution $u = t^2 - 2t + 4$ to find x in terms of t.