

**Problem 1:** Integrate the following:

(a)  $\int \left( x^3 + 2x - 1 + \sqrt{x} - \frac{1}{\sqrt[4]{x}} \right) dx$

(b)  $\int \sin \pi x dx$

(c)  $\int \sqrt[3]{1-2x} dx$

(d)  $\int (\ln x)^2 dx$

(e)  $\int \sec(1-x) dx$

(f)  $\int (5x+6)^8 dx$

(g)  $\int \sin^5 x \cos^2 x dx$

(h)  $\int x^3 \sin 2x dx$

(i)  $\int \ln x dx$

(j)  $\int \cos^3 x dx$

(k)  $\int \arcsin x dx$

(l)  $\int \frac{dx}{9x^2+1}$

(m)  $\int x^2 \ln x dx$

(n)  $\int \frac{x-\sqrt{x}}{\sqrt{x}} dx$

(o)  $\int x^3 \cos\left(\frac{x}{2}\right) dx$

**Problem 2:** Integrate the following:

(a)  $\int \tan^5 x \sec^5 x dx$

(b)  $\int \frac{x^3}{(x^2+5)^2} dx$

(c)  $\int \frac{dx}{x^2+4}$

(d)  $\int \frac{dx}{9x^2+1}$

(e)  $\int \frac{x^3+x+5}{x^2} dx$

(f)  $\int \arctan x dx$

(g)  $\int x^3 \cos x^2 dx$

(h)  $\int \sin(3x) \cos\left(\frac{x}{3}\right) dx$

(i)  $\int \frac{x+4}{x+1} dx$

(j)  $\int x^3 \left( 2x^3 - x + 1 - \frac{5}{\sqrt[3]{x}} \right) dx$

(k)  $\int e^{x/2} \cos x dx$

(l)  $\int \tan^8 x \sec^4 x dx$

(m)  $\int \sin^4 x dx$

(n)  $\int \left( \frac{\ln x}{x} \right)^2 dx$

(o)  $\int \frac{1-\sin x}{\cos x} dx$

(p)  $\int x^3 e^{3x} dx$

(q)  $\int \frac{3}{5x^2+4} dx$

**Problem 3:** Set up the disk/shell methods, but do not evaluate, for calculating the volume in the following situations:

- (a) Revolving the region bound by  $y = x^2$ ,  $y = \sqrt[3]{x}$  about  $x = -3$ .
- (b) Revolving the region bound by  $y = \sqrt{x-1}$ , the  $x$ -axis, and  $x = 10$  about  $y = 5$ .
- (c) Revolving the region bound by  $y = x^2 + 3$ , the  $y$ -axis, and  $y = 12$  about  $y = -3$ .