1. Evaluate the integral

    (a) $\displaystyle\int \frac{x^2}{\sqrt{4+x^2}}\, dx$

    (b) $\displaystyle\int \frac{x}{\sqrt{6x-x^2}}\, dx$

    (c) $\displaystyle\int \frac{dx}{x^2\,\sqrt{25x^2-9}}$

2. Evaluate the integral

    (a) $\displaystyle\int \frac{7}{(x-2)(x+5)}\, dx$

    (b) $\displaystyle\int \frac{x^5}{(x-2)^2}\, dx$

    (c) $\displaystyle\int \frac{x^2-3x+7}{(x-1)(x^2+1)}\,dx$

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

3. Decompose into partial fractions the rational function without computing coefficient of the decomposition:

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

4. Compute the following integrals or show that they are diverge.

    (a) $\displaystyle\int_{e}^{\infty} \frac{dx}{x\,\ln^5 x}$

    (b) $\displaystyle\int_{-\infty}^{0} (1+x)e^x\, dx$

    (c) $\displaystyle\int_{-\infty}^{\infty} \frac{5x^4}{(x^5+3)^3}dx$

    (d) $\displaystyle\int_{0}^{9} \frac{dx}{\sqrt[3]{x-4}}$

5. Determine whether the given integrals converge or diverge using the Comparison Theorem.

    (a) $\displaystyle\int_{0}^{\infty} \frac{dx}{x^7+e^{7x}}$

    (b) $\displaystyle\int_{5}^{\infty} \frac{x^2}{x^{5/2}-x}dx$

    (c) $\displaystyle\int_{10}^{\infty} \frac{\sin^4(7x)}{x^7}dx$