

(1) Find the indefinite integrals.

(a)  $\int \cos^3 x \, dx$

(b)  $\int \sec^4 x \, dx$

(c)  $\int \frac{dt}{t^2 + 2t + 1}$

(d)  $\int \frac{dt}{t^2 + 2t + 2}$

(2) Find the definite integrals.

(a)  $\int_0^2 x^2 + x + 1 \, dx$

(b)  $\int_{-1}^2 3x^2 - 2x + 1 \, dx$

(c)  $\int_1^5 \frac{1}{x^2} \, dx$

(d)  $\int_{-1}^5 \frac{1}{x^2} \, dx$

(e)  $\int_0^\pi \cos x \, dx$

(f)  $\int_1^8 5x^{\frac{2}{3}} \, dx$

(g)  $\int_0^{\sqrt{3}} \frac{1}{1+t^2} \, dt$

(h)  $\int_0^{32} x^{\frac{2}{5}} \, dx$

(i)  $\int_4^9 \frac{2}{\sqrt{x}} \, dx$

(j)  $\int_0^{\frac{\pi}{4}} \sec^2 t \, dt$

(3) Show that  $\ln 5 < 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4}$ .