Tutorial 8 10

1. (*Easy!*) Evaluate the following indefinite integrals.

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

   (b) $\int \left( \dfrac{1}{x^3} + \dfrac{1}{x^2} + \dfrac{1}{x} \right) dx$

   (c) $\int \sqrt{\pi} e^\pi\, dx$

   (d) $\int (e^x + 1)(e^x - 1)\, dx$

2. Evaluate the following integrals by using the given substitution.

   (a) $\int e^{4x-5}\, dx; \quad u = 4x - 5$

   (b) $\int \dfrac{x-1}{x^2 - 2x + 4}\, dx\ ; \quad u = x^2 - 2x + 4$

   (c) $\int \dfrac{x-1}{\sqrt{x^2 - 2x + 3}} dx; \quad u = x^2 - 2x + 3$

   (d) $\int \dfrac{dx}{x \ln x}; \quad u = \ln x$

3. (*Challenging!*) It is given that $\dfrac{d}{dx}(\sin x) = \cos x$ and $\dfrac{d}{dx}(\cos x) = -\sin x$. Evaluate the following integrals.

   (a) $\int \sec x \tan x\, dx$    (Hint: Find $\dfrac{d}{dx} \sec x$)

   (b) $\int \sec^2 x\, dx$        (Hint: Find $\dfrac{d}{dx} \tan x$)

   (c) $\int \tan x\, dx$          (Hint: Let $u = \sec x$)

   (d) $\int \sec x\, dx$          (Hint: Let $u = \sec x + \tan x$)