

## Quiz 1

- (1) Evaluate the integral  $\int_1^2 x\sqrt{x-1}dx$ .

Solution: set  $u = x - 1$ , and the integral equals to

$$\int_0^1 (u+1)\sqrt{u}du = \frac{2}{5}u^{\frac{5}{2}} + \frac{2}{3}u^{\frac{3}{2}}\Big|_0^1 = \frac{16}{15}.$$

- (2) Evaluate the integral  $\int \frac{e^x + 1}{(e^x + x)^2}dx$ .

Solution: set  $u = e^x + x$ , then  $du = (e^x + 1)dx$ , so the above integral equals to

$$\int u^{-2}du = -u^{-1} + C = -\frac{1}{e^x + x} + C.$$

- (3) Find the area of the region enclosed by the curves  $x = 5 - y^2$  and  $x = y^2 - 3$ .

Setting  $5 - y^2 = y^2 - 3$ , you get  $y = 2, -2$ .

Sketch the graph, draw the horizontal stick for this problem, and set up the integral as

$$\int_{-2}^2 (5 - y^2 - (y^2 - 3))dy = 8y - \frac{2}{3}y^3\Big|_{-2}^2 = \frac{64}{3}.$$