

Calculus I - Quiz 5

Name: *Solutions*

(All work must be shown clearly to get full credit. Calculators are *not* allowed in this quiz.)

1. [5 pts] Find  $\int \frac{dx}{x+\sqrt{x}}$ .

2. [5 pts] Find  $\frac{dy}{dx}$  of  $y = \int_0^{\sin x} \frac{dt}{\sqrt{1-t^2}}$ .

① Let  $\sqrt{x} = u \Rightarrow x = u^2 \Rightarrow dx = 2u du$

$$\therefore \int \frac{dx}{x+\sqrt{x}} = \int \frac{2u du}{u^2+u} = 2 \int \frac{du}{u+1} = 2 \ln|u+1| + C = 2 \ln|\sqrt{x}+1| + C$$

② Let  $\sin x = u$

$$\text{so, } \frac{d}{dx} \int_0^{\sin x} \frac{dt}{\sqrt{1-t^2}} = \frac{d}{du} \int_0^u \frac{dt}{\sqrt{1-t^2}} \cdot \frac{du}{dx}$$

$$= \frac{1}{\sqrt{1-u^2}} \cdot \cos x$$

$$= \frac{\cos x}{\sqrt{1-\sin^2 x}} = 1.$$