MAT1001 – T01-04

Student ID Name:

Quiz 7

(15 minutes on Tuesday, 3 Nov 2020)

1. [9 points] Define

$$f(x)=\begin{cases}\sqrt[3]{1-x}, & 0\le x<1\\ x+1, & 1\le x\le 2\end{cases} \quad \text{and} \quad G(x)=\int_1^x f(t)dt$$

Answer if the following statements are True or False (no need to show your work):

(a) $f(x)$ is integrable on interval $[0,2]$.

(b) $G(x)$ is continuous on $[0,2]$.

(c) $G(x)$ is differentiable on $[0,2]$.

Show your work for the questions below:

2. [12 points] Calculate the following indefinite integrals by the substitution method and/or any other available methods:

(a) $\int x^3\cdot\sqrt{x^2+1}dx$

(b) $\int \frac{1}{x}\cos^2(\ln x)dx$

3. [12 points] Calculate the following definite integrals:

(a) $\int_0^{\pi/2}\frac{dx}{\sec x+\tan x}$ (you may take $u=\sin x$)

(b) $\int_{-2}^{2}\frac{x^4-3x^3+6x}{|x|^5+1}dx$ (you may use the integrals of symmetric functions)

4. [7 points] Calculate the area encircled by the curves $y=4\sqrt{x}$ and $y=x^{5/2}$.