

Spring 2021 MATH231 Section CDQ Discussion

WF 9-10am This document can be found [here](#).

Contact

- TA for section CDQ: Xinran Yu
- Email: xinran4@illinois.edu. Please included MATH231 in email subject.
- Office hour: Wed 10-11am¹

Zoom

- Please use your cameras and microphones in breakout rooms.
- Interrupt me/using the “Raise Hand” feature on Zoom to ask questions.
- You can call me into your breakout room/return to the main room to ask for help.
- It is also possible for me to join your breakout rooms randomly to check if you have any questions.

Worksheet

- Worksheet can be found on [Moodle](#) under Groupwork folder.

Submission

- Submit on [Moodle](#) under Groupwork folder.
- **1 submission per group.** Once a file is uploaded, everyone in the same group will be able to see/edit the file. ²
- Group remains the same until each midterm.
- 1st worksheet of the week is due on **Thursday** at **8AM** CST. ³
- 2nd worksheet of the week is due on **Saturday** at **8AM** CST.
- Worksheet solutions available at 12:30PM CST on the due date.

Grading

Worksheets are graded with 2, 1 or 0.

2 - the worksheet uploaded is satisfactory

1 - the worksheet uploaded is unsatisfactory and needs improvement. Your TA will comment on what should be improved for next time.

0 - the worksheet was not uploaded

¹Office hour is run for all students in MATH231

²Groups are assigned randomly by Moodle

³Central Standard Time

Contents

1	Week 1 Wed	3
2	Week 1 Fri	4
3	Week 2 Wed	4

1 Week 1 Wed

Recall

Theorem 1.1 (Fundamental Theorem of Calculus). [Ref p.26](#)

Part 1 If $f(x)$ is **continuous** over an interval $[a, b]$, and the function $F(x)$ is defined by

$$F(x) = \int_a^x f(t) \, dt, \quad x \in [a, b]$$

then $F'(x) = f(x)$ over $[a, b]$.

Part 2 If $f(x)$ is **continuous** over an interval $[a, b]$, and $F(x)$ is any antiderivative of $f(x)$ i.e. $F'(x) = f(x)$, then

$$\int_a^b f(x) \, dx = F(a) - F(b).$$

Example 1.2. Let

$$g(x) = \int_a^{b(x)} f(t) \, dt$$

Apply chain rule and FTC

$$g(x) = \frac{d}{dx} \int_c^{b(x)} f(t) \, dt = b'(x) \cdot f(b(x)).$$

2 Week 1 Fri

Recall

-

$$\frac{d}{dx} \arctan(x) = \frac{1}{1+x^2}$$

- If $u = x + C$,

$$du = \frac{du}{dx} dx = 1 \cdot dx.$$

- Change of variable, let $u = g(x)$, then

$$\int_a^b f(g(x))g'(x) dx = \int_c^d f(u) du.$$

3 Week 2 Wed

Recall the area between $g(x)$ and $f(x)$ is

$$\int_a^b g(x) - f(x) dx.$$