

MAT135H5 F - FALL 2020 - WRITTEN ASSIGNMENT 1

SUBMISSION

- **You must submit your completed Written Assignment on Crowdmark by 6:00pm (EDT) Friday September 25, 2020.** You will be emailed a link from Crowdmark with information on how to submit your solutions.
- Late assignments (even by a couple seconds) will not be accepted.
- Consider submitting your assignment well before the deadline. (1400 students all trying to submit at 5:59pm will break Crowdmark.)
- You do not need to print out this assignment; you may submit clear pictures/scans of your work on lined paper, or screenshots of your work.
- You do not need to submit the cover page, the grading scheme, or Part 3 of Question 3.
- You must correctly orient/rotate and order your submission.
- If you require additional space, please insert extra pages.

WHAT IF I DON'T HAVE A UTORID YET? HOW DO I SUBMIT MY SOLUTIONS?

We will synchronize your Quercus information to Crowdmark frequently. When you receive your utoronto email, then you be emailed a link from Crowdmark with instructions on how to upload your solutions. If you do not have your utoronto email address by Thursday September 24, then please email the course coordinator (Mike Pawliuk) then.

ADDITIONAL INSTRUCTIONS

You must justify and support your solution to each question. You should use full sentences.

ACADEMIC INTEGRITY

You are encouraged to work with your fellow students while working on questions from the written assignments. However, the writing of your assignment must be done without any assistance whatsoever. Do not post partial or complete solutions to Piazza.

I affirm that this assignment represents entirely my own efforts. I confirm that:

- I have not copied any portion of this work.
- I have not allowed someone else in the course to copy this work.
- This is the final version of my assignment and not a draft.
- I understand the consequences of violating the University's academic integrity policies as outlined in the *Code of Behaviour on Academic Matters*.

By submitting solutions for grading I agree that the statements above are true. If I do not agree with the statements above, I will not submit my assignment and will consult the course coordinator (Mike Pawliuk) immediately.

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GRADING SCHEME

This is the grading scheme that TAs will use when grading this assignment. You do not need to submit this page.

Question 1. [6 points]. Each part is worth 2 points: 1 point for a correct answer, and 1 point for a clear and complete solution with full sentences.

For this question only, one total point may be deducted if the pages are not oriented or ordered correctly.

Question 2 [3 points]. Each part is worth 1 points: 1 point for a correct answer with explanation. Award no points for correct answers if there is only algebra and no further explanation.

Question 3 [6 points]. Part 1 and Part 2 is worth 3 points: 1 point for a good start (possibly including a correctly labelled diagram), 1 point for a correct answer, and 1 point for a clear and complete explanation with full sentences. Part 3 should not be graded.

Question 1. For this question, let $f : [0, +\infty) \rightarrow \mathbb{R}$ be defined by $f(x) = \sqrt{x}$, and let $f^{-1}(x)$ be its inverse function.

(1) What is the domain and range of the function $f^{-1}(x)$? Justify your answer.

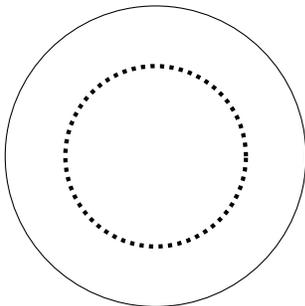
(2) What are the domains and ranges of the functions $f \circ f^{-1}(x)$ and $f^{-1} \circ f(x)$? Justify your answer.

(3) Are $(\sqrt{x})^2$ and $\sqrt{x^2}$ always equal for all real numbers x ? Justify your answer.

Question 3. Alice and Bob are pizza anarchists, which means they enjoy cutting their pizza into two parts of equal area in unusual ways. They have a circular pizza of positive radius R .

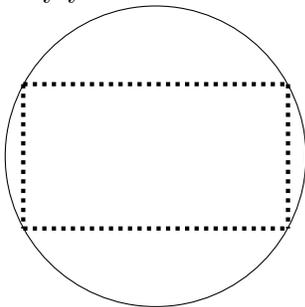
- (1) For their first experiment, they cut a circular disk out of a pizza. Alice gets the smaller disk, and Bob gets the outer ring of pizza.

Find the radius r of this smaller disk that will make Alice and Bob have equal amounts of pizza. Justify your solution.



- (2) For their second experiment, they cut a rectangle out of a pizza so that all four of its corners touch the edge of the pizza. Alice gets the rectangular piece, and Bob gets the 4 other pieces.

Find the dimensions x, y of this rectangle that will make Alice and Bob have equal amounts of pizza. Justify your solution. Hint: What is the diagonal?



- (3) **This part is not for marks, and you should not submit it.** Alice and Bob have been trying to evenly split up the pizza by giving Alice a triangular piece of pizza whose corners all touch the edge of the circular pizza.

Show that this is impossible for them to do no matter how they make the triangle.

