MATH 460   **Name:**
Homework 2, Fall 2023

Homework 2 has questions 1 through 3 with a total of 70 points. When I record your grade, I will scale it to twenty points. For details of the grading scheme for this assignment, please see the section 'Grading rubric' of our syllabus.

　　Revise, proofread, revise again (and again), typeset your work using Overleaf, and upload the converted pdf of your compiled file work to Canvas. This work is due **Saturday 2 September** at 11:59 P M.

　　For Question 1, I will compile the class work into a single document. To allow me to do this without retyping your work, copy a link to your Overleaf file (either read only or read and write) here: (insert a url for your Overleaf work).

1. Define a set of sets $\mathscr{C}$ by $\mathscr{C} = \{\{\pi\}, \{\pi, \infty\}, \{\pi, \infty, \sqrt{3}\}\}$ Enumerate the members of each of the following sets:

    `10`   (a) $\bigcap\limits_{x \in \mathscr{C}} x$

    > **Solution:**

    `10`   (b) $\bigcup\limits_{x \in \mathscr{C}} x$

    > **Solution:**

    `10`   (c) $\bigcup\limits_{x \in \mathscr{C}} x \setminus \bigcap\limits_{x \in \mathscr{C}} x$

    > **Solution:**

`10` 2. Let X and Y be sets and let $F \in X \to Y$. For all subsets A and B of X, show that $F(A \cap B) \subset F(A) \cap F(B)$.

    > **Solution:**

3. Define $F = x \in \mathbf{R} \mapsto x^2$. For these problems, freely assume all College Algebra facts about real numbers and square roots.

    `10`   (a) Show that $F((-\infty, 0)) = (0, \infty)$.

Solution:

10   (b) Show that $F((0,\infty)) = (0,\infty)$.

Solution:

10   (c) Find an example of subsets A and B of $\mathbf{R}$ such that $F(A \cap B) \not\subset F(A) \cap F(B)$.

Solution: