

DIRECTIONS:

- No papers, phones, calculators, or gadgets are permitted to be out during the quiz.
- Show all work, clearly and in order **You will lose points if any of these instructions are not followed.**

Questions	Points	Score
1	1	
2	2	
3	2	
Total	5	

Problem 1: (1 points) Let $A = (-\infty, 1]$, $B = \{1\}$, $C = (-1, 1]$. Determine the interval $(A \cup B) \cap C$.

The interval is

$$(A \cup B) \cap C = (-1, 1].$$

Problem 2: (2 point) Consider the expression $f(x) = \frac{x^4 - 4x^2}{x(x+2)}$.

(a) (1 point) What is the set of points at which f does not exist? Please give your answer in set notation.

The set of points at which f does not exist is $\{0, -2\}$.

(b) (1 point) What is the solution set of the equation $f(x) \leq 0$. Please give your answer in set notation.

First we factor and cancel, while keeping in mind the answer to part (a)

$$\frac{x^4 - 4x^2}{x(x+2)} = \frac{x^2(x-2)(x+2)}{x(x+2)} \leq 0.$$

Simplifying (while remembering (a)) we consider

$$x(x-2) \leq 0,$$

which means either (1) $x \leq 0$ and $x \geq 2$ (which is the empty set) or (2) $x \geq 0$ and $x \leq 2$ which is the interval $[0, 2]$

So excluding the points at which f does not exist the solution set $S = \{x \in \mathbb{R} | 0 < x \leq 2\}$.

Problem 3: (2 points) For each of the following, mark the statement as either true (T) or false (F).

(a) (0.5 points) No set can be both open and closed. “_____ F _____.”

(b) (0.5 points) $\frac{2B}{B} = 2$ for all values of B . “_____ F _____.”

(c) (0.5 points) $AB = 0 \iff B = 0$. “_____ F _____.”

(d) (0.5 points) There is a formula that can be used to factor every possible polynomial (hint: consider $x^2 + 1$). “_____ F _____.”