staple

													,															
L	A	S	T		N	A	M	E					,	F	I	R	S	T		N	A	M	E					

Homework H02

MATH 3110/5110 (Barsamian)

Due at the start of class Fri, Jan 31, 2020

Problem:	1	2	3	4	5	Total	Rescaled
Your Score:							
Possible:	20	20	20	20	20	100	10

There is a large collection of ***Suggested Exercises*** for the third week. (The whole list of suggested exercises for the course can be found on the web page.These exercises are not to be turned in and are not graded, but you should write down solutions for as many of them as possible and keep your solutions in a notebook for study.)

1.3 # 1, 2, 3, 4, 5, 6, 9, 8, 10, 11, 12, 13

2.1 # 1, 3, 5, 6, 8, 10, 11, 12, 13, 16, 18, 19, 24

The five problems presented on this cover sheet are your ***Homework Assignment*** to be turned in.

- Write your solutions on your own paper.
- Assemble your solutions in order
- Staple this Cover Sheet to the front of your solutions.
- The assignment is due at the start of class on Friday, Jan 31, 2020.

[1] (similar to 1.3#1,2 and class examples) Consider the following four functions:

(a) $f(x) = x^3 - 6x^2 + 11x - 6 = (x-1)(x-2)(x-3)$

(b) $f(x) = x^3$

(c) $f(x) = x^2$

(d) $f(x) = e^{(x)}$

For each function, do the following:

(i) Prove that the function is injective or give a counterexample to show that it is not.

(ii) Prove that the function is surjective or give a counterexample to show that it is not.

You are welcome to base your proofs or counterexamples on graphs of the functions, if you want. And you are even welcome to use printouts of graphs obtained from the web. (Or hand-drawn graphs inspired by web graphs.) But the graphs need to be clear and well labeled and the explanations need to be clear.

[2] (similar to 1.3#1a, 2b and class examples)

Define sets $A = \mathbb{R} - \{7\}$ and $B = \mathbb{R} - \{1\}$ and define function $f: A \to B$ by the formula $f(x) = \frac{x-3}{x-7}$

(a) Show that f is bijective.

(b) Find a formula for the inverse function $f^{-1}: B \to A$. Show all steps clearly.

[3] (Similar to 1.3#11 and a class example) Given functions $f: S \to T$ and $g: T \to V$, we know that the composition $g \circ f$ is a function with domain S and range V. That is, $g \circ f: S \to V$.

Prove or disprove: If $g \circ f$ is injective, then both f and g must be injective.

[4] Book problem 2.1 # 13

[5] Book problem 2.1 # 19

.