My grades for **CSCI 1315 Module 1 Summative Test**

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The First Five Minutes Check List

- ☐ Read all of the questions in the test
- ☐ Determine which questions you will do in which order. You can use the following chart to help you.
- ☐ Make any notes to yourself for questions
- ☐ Take a breath
- ☐ Good luck!

Grade Breakdown

Section	Question	Total Possible	Order	Notes
Section A	1-7	14		LO: Definitions of Key Terms
Section B		23		
	1	4		LO: Elements, Subsets, and Power Set
	2	4		LO: Set Notation, Union, Intersection
	3	9		LO: Relations, Closures, Equivalence Relation
	4	6		LO: Functions, Injective, Surjective
C	1	4		LO: Bijective Functions
Total		41		

2

SecA 14

Section A: Definition Questions

[**2 + 2 + 2 + 2 + 2 + 2 + 2 marks**] Define or give reasoning for the following:

1. What is the difference between a set and a relation?

A set is a collection of distinct objects while a relation is a pair of n components related to a set.

correct
2

2. What is the difference between an element of a set and a subset of a set?

An element of a set is an object that is contained in a set while the subset of a set is a set which ~~must~~ each element is also an element of the set

correct
2

3. Name and describe the three different properties of relations. You may give examples to demonstrate your explanation.

1. ~~Pairwise relation~~ Reflexive relation - For $x \in A$, $(x, x) \in R$.
2. ~~Mathematical expression~~ Transitive relation - For $(x, y) \in R$, $(y, z) \in R$ there is a short $(x, z) \in R$.
3. Symmetric relation: For $(x, y) \in R$, there is $(y, x) \in R$

correct
2

4. What is the power set of a set, and how many elements does it have with respect to a finite set A where $|A| = n$?

The power set of a set is a set that contains all possible subsets of a given set

The number of elements in a power set of a given set(A) is equal to $2^{|A|}$ when $|A|$ is the cardinality of the set. i.e $pow(A) = 2^{|A|}$

correct
2

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5. What does it mean for a function to be bijective? Explain all terms that you use.

A Function is said to be bijective if it is both injective and surjective.

Injective:- A function is said to be injective if ~~every~~ each element in the domain aren't equal and map to different elements in the codomain (has a unique co-domain)

Surjective:- A function is said to be surjective if ~~each~~ every element in the co domain has an element in the domain it is mapped to.

correct

2

6. Give an example of an application in computer science using sets or relations. You do not need to go into detail, but should give an explanation.

Set is used in the use of RGB colours, this uses a set of 3 numbers between 0 and 255 to make colours.

correct

2

7. Give an example of an application in computer science using functions. You do not need to go into detail, but should give an explanation.

Boolean Function

Computer is [illegible] true and False.

correct

2

4

SecB 1 **3**

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Section B: Short Answer Questions

1. [**4 marks**] Consider the set $A = \{\emptyset, \mathbb{N}, \{1,2\}\}$. Are the following statements true or false? Explain why you chose your answer.

(a) $\{1,2\} \subseteq A$

FALSE

(b)

(c)

(d)

Student states that the statement

$\{\emptyset\} \neq \emptyset$

Student has not demonstrated that the statement is false

0

state

0.5

0.5

0.

SecB 2 **3**

2. [4 ma

bracke

(a)

$= \{0, 1, 2, 3, 4, 6, 8\}$

(b) $\{x \in \mathbb{Z} : |x| \leq 5\} \cap \{x \in \mathbb{N} : x < 10^{100}\}$.

$\{x \in Z : |x| \leq 5\}$; $x = \{-5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5\}$

$\{x \in N : x < 10^{100}\}$; $x = \{N < 10^{100}\}$.

Intersection

$= \{0, 1, 2, 3, 4, 5\}$

List th

or pa

ments

descr

Q2 - a): Students demonstrates that they understand set union.

1

they understand set intersection.

1

SecB 3 **8.5**

RGB

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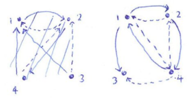
3. [**9 marks**] Consider the following relation on $A = \{1, 2, 3, 4\}$:

$$R = \{(1,2), (2,4), (4,1), (1,3)\}.$$

(a) Find the Transitive closure of R, and call it R_1.

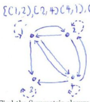


Transitive c...

= R ∪ ...

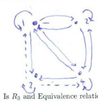
(b) Find the Reflexive closure of R_1, and call it R_2.

$R_1 = \{(1,2),(2,4),(4,1),(1,3),(4,3),(1,4),(2,$ ...



(c) Find the Symmetric closure o...

$R_2 = \{(1,2),(2,4),(4,1)$ ...



(d) Is R_3 and Equivalence relatio...

R_3 is not an equiv...

R_3 is reflexive and sy...

R_3 is not transitive be...

a)Student demonstrates that they understand transitivity **1**

a)S... ge... tra... **-0**...

b)Stud... strates that... derstand re... **1**

...closures as either a full set of pairs or as a union of sets **1**

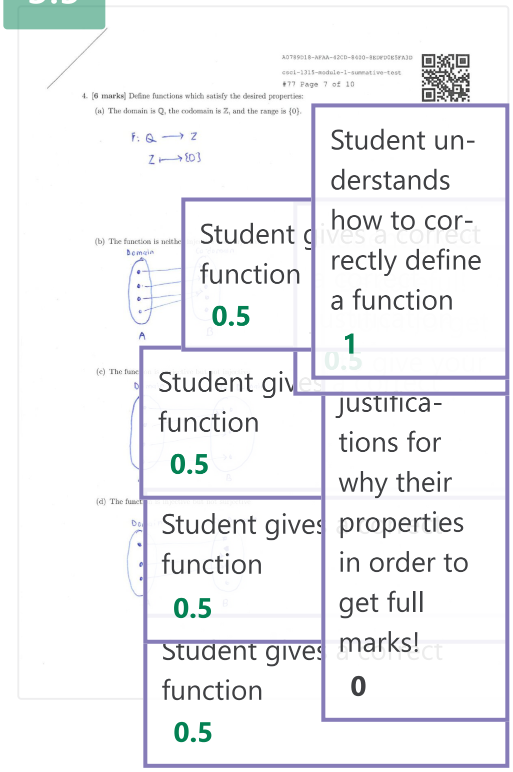
c)Studen... strates th... derstand... **1**

...ric closure of their R2 **1**

d)Student... tion is not an equiva... tion (based on work) **1**

1

SecB 4 **3.5**



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4. **[6 marks]** Define functions which satisfy the desired properties:

(a) The domain is $\mathbb{Q}$, the codomain is $\mathbb{Z}$, and the range is $\{0\}$.

$F: Q \longrightarrow Z$

$Z \longmapsto \{0\}$

(b) The function is neithe

Domain

A

(c) The func

(d) The func

Student understands how to correctly define a function **1**

Student gives a correct function **0.5**

Student gives function **0.5**

Student gives function **0.5**

Student gives function **0.5**

justifications for why their properties in order to get full marks! **0**

SecC 1 3

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Section C: Long Answer Questions

1. **[4 marks]** Is the function

$$f : \mathbb{R} \setminus \{2\} \to \mathbb{R} \setminus \{5\}$$
$$x \mapsto \frac{5x+1}{x-2}$$

a bijective function? Why or why not?

The Function is ~~not~~ a bijective Function (both surjective and injective)

~~not~~ injective

~~Not surjective . .~~

~~There is a real~~

~~but not part of~~

~~If we try $\frac{5x+1}{x-2}$~~

(Injective

Surjective

a rational

$\frac{5x}{x}$

~~Not~~ injective .

No two rational nu

rational number in

Student gives correct answer on bijectivity (based on work)

1

Student knows to demonstrate surjective

0.5

Student knows to demonstrate injective

0.5

Student has not (yet!) attempted to show that the function is injective

0

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SCRAP PAPER - WORK ON THIS PAGE WILL NOT BE GRADED