# **Section 2 Assignment (77 points) - Functions**

To receive credit, you must either show your work on the worksheet or explain how you got the answer.

1. (16 points) Draw an arrow diagram for each of the following functions AND give the range of the function using set notation.
   1. (3 pts) Let A = {q, r, s, t, u} and let B = {2, 3, 4, 5, 6}.

f: A → B is defined as f = {(t, 2), (s, 5), (q, 6), (r, 6), (u, 4)}

* T 2
* S 3
* Q 4
* R 5
* U 6

Range: {2,4,5,6}

1. (3 pts) Let S = {Colton, Devin, Cecilia, Thomas, Skyler} and C = {1030, 1400, 1410, 2130} and g: S → C is defined as g = {(Cecilia, 2130), (Devin, 1400), (Skyler, 2130), (Colton, 1030), (Thomas, 1410)}

* Cecilia 1030
* Devin 1400
* Skyler 1410
* Colton 2130
* Thomas

Range: {2130,1400,1030,1410}

1. (5 pts) Let B = {1, 3, 5, 7}. f: B → Z such that f(b) = b3 - b2 - 1

* 1 15
* 3 95
* 5 287
* 7 -1

Range: {01,15,95,287}

1. (5 pts) Let D = {0, 1, 2, 3, 4}. i: D → Z such that f(d) = |2d – d3|



* 0 4
* 1 21
* 2 56
* 3 1
* 4 0

Range: {0,1,4,21,56}

1. (8 points) Give the floor (F) and ceiling (C) for each item.
   1. (2 pts) -15.001

Floor: -16

Ceiling: -15

* 1. (2 pts) -9.98

Floor: -10

Ceiling: -9

* 1. (2 pts) 14.325

**Floor: 14**

**Ceiling: 15**

* 1. (2 pts) 10.981

Floor: 10

Ceiling: 11

1. (12 points) Are the following functions one-to-one(injective), onto(surjective), both(bijective) or neither?
2. (3 pts) Given A = {q, r, s, t, u}, B = {2, 3, 4, 5, 6}

and f: A → B where f = {(t, 2), (s, 5), (q, 6), (r, 6), (u, 4)}

**codomain: 2,3,4,5,6 != range:2,4,5,6**

**inverse: (2,t) (s,5) (6,q) (6,r) (4,u)**

**the function f is neither one-to-one(injective) nor onto(surjective).**

1. (3 pts) Given S = {Aaron, Peyton, Ryan, Matthew, Madison, Jasim}, C = {1030, 1400, 1410, 2130, 2420}

and g: S → C where g = {(Aaron, 2130), (Jasim, 1400), (Matthew, 2130), (Peyton, 2420), (Ryan, 1410), (Madison, 1030)}

codomain: 1030, 1400, 1410, 2130, 2420 == range: 1030,1400,1410,2130,2420

inverse: (2130, Aaron) (1400, Jasim) (2130, Matthew) (2420, Peyton) (1410, Ryan) (1030, Madison)

the function is not one to one(injective) but it is onto(surjective).

1. (3 pts) Given B = {1, 3, 5, 7}. b: B → Z such that f(b) = b3 - b2 - 1

Codomain: all integers positive & negative != range: -1,15,95,287

Inverse: (-1,1)(15,3)(95,5)(287,7)

This function is one-to-one(injective) but it is not onto(surjective)

1. (3 pts) Given C = {q, r, s, t, u, v, w}, D = {2, 4, 6, 8, 10, 12, 14}

and g: C → D where g = {(t, 2), (s, 4), (q, 6), (w, 8), (u, 10), (r, 12), (v, 14)}

codomain: 2,4,6,8,10,12,14 == range: 2,4,6,8,10,12,14

inverse: (2,t)(4,s)(6,q)(8,w)(10,u)(12,r)(14,v)

this function is bijective

1. (6 points) What is the domain, target(codomain), and range of f?
   1. (3 pts) Given A = {1, 3, 5, 7, 9}, B = {-1, 0, 1} let f: A → B be defined as

f = {(5, 1), (3, 1), (1, 1), (9, 1), (7, 0)}

domain: 1,3,4,5,7,9

codomain: -1,0,1

range: 0,1

* 1. (3 pts) Given C = {0, 1, 2, 3, 4} let g: C → Z+ such that g(c) = 2c

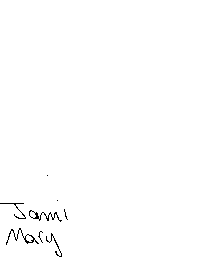
Domain: 0,1,2,3,4

Codomain: 1,2,3,4,5,6,……….

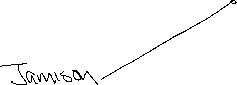
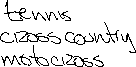
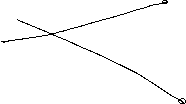
Range: 1, 2, 4, 8, 16

1. (10 points) Each of the arrow diagrams below define a function 𝑓. For each arrow diagram, indicate whether 𝑓−1 is well-defined.

* If 𝑓−1 is not well-defined, indicate why
* If 𝑓−1 is well-defined, give an arrow diagram showing 𝑓−1

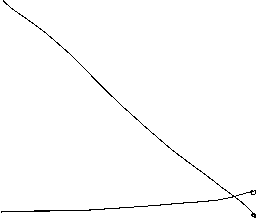
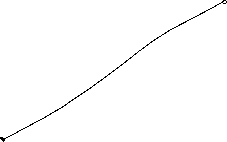


* 1. (5 pts)



F-1 is not well defined in this case because if you switch f to f-1 we will see that tennis will not be mapped from to anything. Therefore f-1 is not well defined.

* 1. (5 pts)



Yes this is well define.

* Johnny green
* Jacob red
* Burke blue
* Aldon black
* Joey orange
* Steven yellow
* Constance cyan
* Bryan gray

1. (25 points) Composition of Functions.

Let A = B = \mathbb{R}, f(a) = a3 - a2 – a and g(b) = |2b – b3|

* 1. (5 pts) (g o f) (-2)

f(-2) = (-2)^3 – (-2)^2 – (-2) = -10

g(-10) = |2(-10) – (-10)^3| = 980

* 1. (5 pts) (g o f) (2)

f(2) = (2)^3 – (2)^2 – (2) = 2

g(2) = |2(2) – (2)^3| = |4-8| = |-4| = 4

* 1. (5 pts) (f o g) (1)

g(1) = |2(1) – (1)^3| = 1

f(1) = (1)^3 – (1)^2 – (1) = -1

* 1. (5 pts) (f o f) (3)

f(3) = (3)^3 - (3)^2 – (3) = 15

f(15) = (15)^3 – (15)^2 – (15) = 3135

* 1. (5 pts) (g o g) (-4)

g(-4) = |2(-4) – (-4)^3| = |-8+64| = 56

g(56) = |2(56) – (56)^3| = |112-175616| = 175,504