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.

   a. (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)}

   b. (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)}

   c. (5 pts) Let B = {1, 3, 5, 7}. f: B → Z such that $f(b) = b^3 - b^2 - 1$

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

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

    a. (2 pts) -15.001

    b. (2 pts) -9.98

    c. (2 pts) 14.325

    d. (2 pts) 10.981

3. (12 points) Are the following functions one-to-one(injective), onto(surjective), both(bijective) or neither?

    a. (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)}

    b. (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)}

    c. (3 pts) Given B = {1, 3, 5, 7}. b: B → Z such that $f(b) = b^3 - b^2 - 1$

    d. (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)}

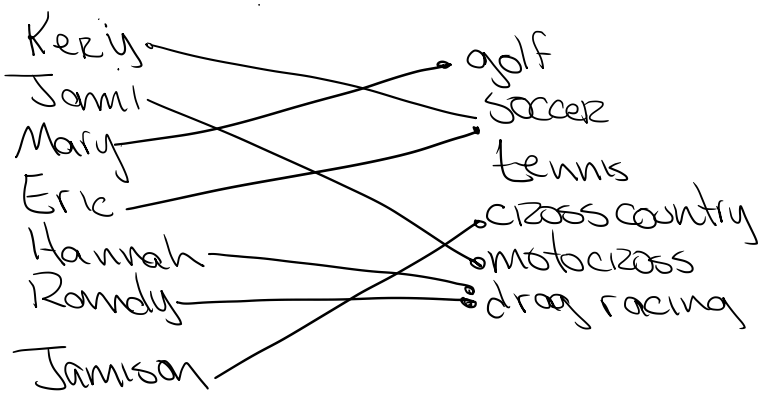
4. (6 points) What is the domain, target(codomain), and range of f?

    a. (3 pts) Given A = {1, 3, 5, 7, 9}, B = {-1, 0, 1} let $f: A \rightarrow B$ be defined as $f = \{(5, 1), (3, 1), (1, 1), (9, 1), (7, 0)\}$

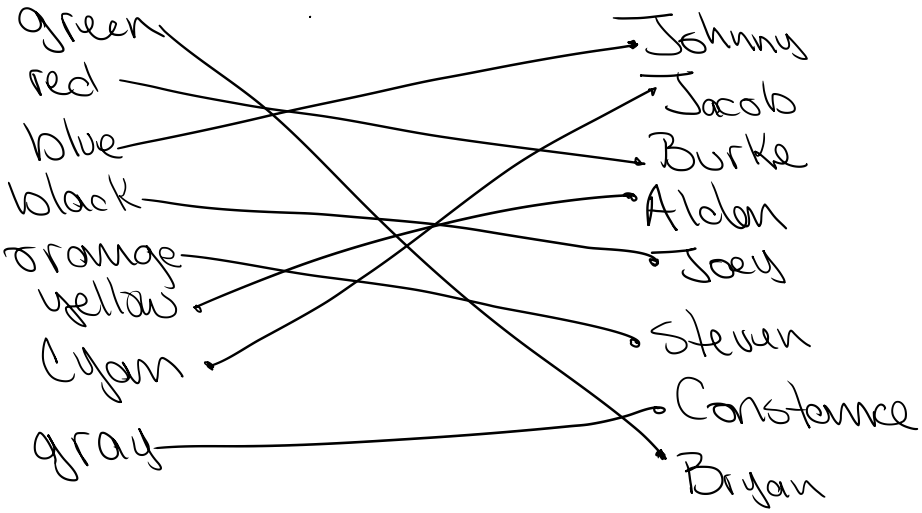
    b. (3 pts) Given C = {0, 1, 2, 3, 4} let g: $C \rightarrow Z^+$ such that $g(c) = 2^c$

5. (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}

   a. (5 pts)



   b. (5 pts)



6. (25 points) Composition of Functions.
   Let A = B = $\mathbb{R}$, $f(a) = a^3 - a^2 - a$ and $g(b) = |2b - b^3|$

a. (5 pts) (g o f) (-2)

b. (5 pts) (g o f) (2)

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

d. (5 pts) (f o f) (3)

e. (5 pts) (g o g) (-4)