# MAT 230 Module Six Homework

**General:**

* Before beginning this homework, be sure to read the textbook sections and the material in Module Six.
* Type your solutions into this document and be sure to show all steps for arriving at your solution. Just giving a final number may not receive full credit.
* You may copy and paste mathematical symbols from the statements of the questions into your solution. This document was created using the Arial Unicode font.
* These homework problems are proprietary to SNHU COCE. They may not be posted on any non-SNHU website.
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1. For A = {a, b, c, d, e} and B = {yellow, orange, blue, green, white, red, black}.
   1. Define a relation R from A to B that is a function and contains at least 4 ordered pairs.
   2. What is the domain of this function?
   3. What is the range of this function?

This problem is similar to Example 2 and to Exercises 1 and 2 in Section 5.1 of your SNHU MAT230 textbook.

1. R = {(a, yellow), (b, orange), (c, blue), (d, green)}
2. {a, b, c, d}
3. {yellow, orange, blue, green}
4. Define functions f: ℝ → ℝ and g: ℝ → ℝ by f(a) = 2 + a and g(b) = 3b – 1. Find the following, showing the steps to get to your solution.
   1. (f ○ g) (0).
   2. (g ○ f) (1).
   3. (f ○ g) (x).
   4. (g ○ f) (x).

This problem is similar to Example 9 and to Exercises 9 and 10 in Section 5.1 of your SNHU MAT230 textbook.

1. Let A = {CA, NH, IL, OH, SC, WV, PA, TX} and B = {book, table, chair, fork, road, car}. Using at least 5 ordered pairs, specify the following:
   1. Define a function f from A to B that is one-to-one.
   2. Define a function g from A to B that is not one-to-one.
   3. Define a function h from A to B that is onto.
   4. Define a function α from A to B that is not onto.
   5. Define a function β from B to A that acts as the inverse of the function f that you created in part a) of this problem.

This problem is similar to Examples 10–12 and to Exercises 11 and 12 in Section 5.1 of your SNHU MAT230 textbook.

1. The function f: ℝ → ℝ defined by f(x) = 7x is onto because for any real number r, we have that r/7 is a real number and f(r/7) = r. Consider the same function defined on the integers g: ℤ → ℤ by g(n) = 7n. Explain why g is not onto ℤ and give one integer that g cannot output.

This problem is similar to Examples 10–12 and to Exercises 13–17 in Section 5.1 of your SNHU MAT230 textbook.

1. Since we are mapping all integer ℤ to all integer ℤ by our function, there will be some integers that will not appear in our set. For example, 1 would map to 7 and 2 would map to 14, but nothing in our case would map to 13. An onto function has to use all y-values.
2. Let f: ℝ → ℝ be the function f(x) = x3 – 1. Find f–1 (x) and verify that it is the inverse of f.

This problem is similar to Examples 16 and 17 and to Exercises 20–22 in Section 5.1 of your SNHU MAT230 textbook.

If we use 2 as our x value in our original function, we get 7. If we, in turn, use 7 in our inverse function, we get 2.

1. Suppose a health insurance company identifies each member with an 8-digit account number. Define the hashing function h that first takes the first 3 digits of an account number as one number and the last 5 digits as another number, then adds them, and lastly applies the mod–37 function.

This problem is similar to Example 10 and to Exercises 24–26 in Section 5.2 of your SNHU MAT230 textbook.

* 1. How many linked lists does this create?
  2. Compute h(59243973).
  3. Compute h(42280135).

1. 37
2. 17
3. 16
4. Compute the check digit c for the 10-digit ISBN codes below. Show the calculations that you used to obtain your answers.

This problem is similar to Exercise 49 in Section 5.2 of your SNHU MAT230 textbook.

1. 0-523-76952-c (the initial 0 indicates that this is an English book)
2. 2-426-25967-c (the initial 2 indicates that this is a French book)

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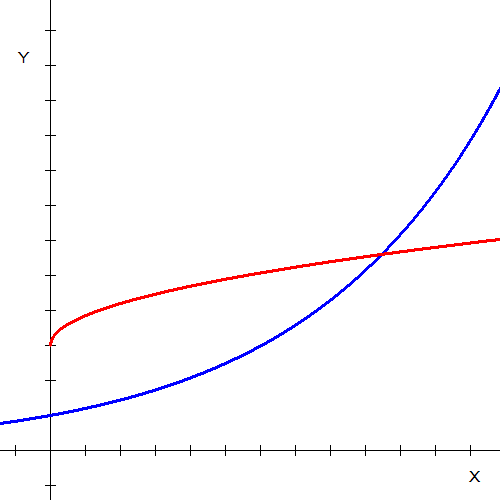
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1. The picture below shows the graph of f(x) in red and the graph of b(x) in blue. Does the graph show that r is O(b), or that b is O(r), both, or neither? Explain your answer.

This problem is similar to Example 5 and to Exercise 11 in Section 5.3 of your SNHU MAT230 textbook.



r is 0(b) because at towards the end of the graph, b > r. Or r < cf

1. Define a relation R on the set of positive real numbers by (x, y) ∈ R if and only if  
   x2 – y2 = 0. Determine if the relation R is a partial order. If it is not a partial order, explain which property or properties R fails to have.

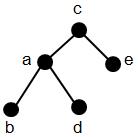
This problem is similar to Example 5 and to Exercises 1–3 in Section 6.1 of your SNHU MAT230 textbook.

In order for this fulfill the set, we would have all positive real numbers, but x and y will always be the same:

Because of this, our set is reflexive as (a,a) always exists. It is also antisymmetric because (a, b) and (b, a) are in this set and a = b. It is also transitive because we cannot prove that it is not. This fulfills the properties of a partial order, thus our set is a partial order.

1. Determine the ordered pairs in the relation determined by the Hasse diagram below on the set A = {a, b, c, d, e}. Create the matrix representation of this poset.

This problem is similar to Example 11 and to Exercises 11 and 12 in Section 6.1 of your SNHU MAT230 textbook.



1. Define U = {1, 2, 3, 4, 5}. Consider the following subsets of U:

A = {1, 2}, B = {3, 4, 5}, C = {1, 2, 5}, D = {5}

You may use (copy/paste/move/resize/etc.) the images below to create your graph.

This problem is similar to Example 12 and to Exercises 21–24 in Section 6.1 of your SNHU MAT230 textbook.

1. Create the Hasse diagram using ⊆ as the partial order on the sets A, B, C, D, U, and .
2. Is this a linear order? Explain your answer.
3. No, because our set cannot be ordered linearly. For example, A will never be in the set of D or vice versa.
4. If ≺ represents lexicographic order, then which of the following is/are true? Explain your answers.

This problem is similar to Example 9 and Exercises 19 and 20 in Section 6.1 of your SNHU MAT230 textbook.

1. (3, 11) ≺ (3, 0)
2. (4, 7) ≺ (2, 17)
3. (6, 2) and (8, 1) are not comparable because we need the first number to be larger in one of the pairs.
4. True, because
5. False, because
6. False, the first number needs to be smaller or equal. So, these two can be compared.
7. Let B = {2, 3, 4, 6, 12, 24, 36} and R be defined by xRy if and only if x|y.

This problem is similar to Exercise 49 in Section 5.2 of your SNHU MAT230 textbook.

1. Determine all minimal and all maximal elements of the poset.
2. Find all least and greatest elements of the poset. Explain your answers.

This problem is similar to Examples 1–3 and 5–7 and to Exercises 8 and 16 in Section 6.1 of your SNHU MAT230 textbook.

1. Minimal elements: 2, 3. These elements have no values below them on a Hasse Diagram

Maximal Elements: 24, 36. These elements have no values above them on a Hasse Diagram

1. Least element: None since we have more than one minimal element.

Maximal element: None since we have more than one maximal element.