Virginia Tech
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READ THIS NOW!

- Print your name in the space provided below.

- There are 6 short-answer questions, priced as marked. The maximum score is 100.

- The grading of each question will take into account whether you obtained a correct solution and how well you presented your analysis and justified your logic. In most cases, more weight will be given to the presentation and logic than to whether the solution is fully correct.

- When you have finished, sign the pledge at the bottom of this page and turn in the test.

- This is a closed-book, closed-notes examination.

- No laptops, calculators, cell phones or other electronic devices may be used during this examination.

- Until solutions are posted, you may not discuss this examination with any student who has not taken it.

- Failure to adhere to any of these restrictions is an Honor Code violation.

Name (Last, First) _____

printed

Pledge: On my honor, I have neither given nor received unauthorized aid on this examination.

_____

signed

1. [16 points] The Southwest Virginia Chicken Fanciers Club holds an annual show and competition featuring some of their best exotic fowl. This year, there were three entrants from the Montgomery County area: Dwight, Robert, and Joe. Altogether, they entered 36 birds in the competition, including 17 Rhode Island Reds and 6 Scots Greys.

Dwight entered a total of 9 birds, including 3 Rhode Island Reds and his only Leghorn.

Robert entered no Scots Greys.

Joe entered 7 Rhode Island Reds and 5 Leghorns.

How many chickens of each type did each of them enter in the show and competition? Use an appropriate table to externalize, and provide explanations to support your answers!

2. [16 points] Consider the two figures labeled (i) and (ii) below. Write a clear description of s sequence of operations that would transform figure (i) into figure (ii).

(i)   (ii)

Now, draw the figure that would result if you applied the sequence of operations you identified to the figure given below:

3. [16 points] If woodchucks could chuck wood, then three woodchucks could chuck a total of 120 pieces of wood in 30 minutes. So, given a pile of 240 pieces of wood, how many woodchucks would be required in order to chuck all those pieces of wood in 45 minutes?   Externalize and justify your conclusion.

4. [16 points] In each part, state what (other) facts, if any, you can <u>validly</u> infer from the given facts:

a)   If Captain Jack drinks too much rum, then he will set the wrong course. Captain Jack set the correct course.

b)   If George is a logician then he understands *modus ponens*. George understands *modus ponens*.

c)   All cats are mammals. All cats eat mice.

d)   All whales are mammals. Some mammals have flippers.

5. [20 points] Design and write pseudo-code (see the test supplement) for an algorithm that displays true if the group of N numbers at the start and end of a list are the same. For example, with {5, 6, 45, 99, 13, 5, 6}, the ends are the same for n=0 and n=2, and false for n=1 and n=3. Here are some other examples of lists and values of n and the correct display:

List is {5, 6, 45, 99, 13, 5, 6}, n is 1 → display "false"
List is {5, 6, 45, 99, 13, 5, 6}, n is 2 → display "true"
List is {5, 6, 45, 99, 13, 5, 6}, n is 3→ display "false"

6. [16 points] Every Thursday night, Sean relaxes on his couch with a bag of popcorn and watches the Rerun Broadcast Network. This week, RBN aired the pilot episodes of five mystery shows (including *Lawlock*), each of which started at a different time (7:00, 8:00, 9:00, 10:00 or 11:00). The main character of each show had a different job (one was a private investigator) that aided in solving the mystery. Given the following information, determine the time at which each show ran, as well as find the job of each show's main character.

1) The show whose main character was a lawyer aired first.
2) The show whose main character was a police officer aired last.
3) *Ace Norman*, which did not air last, ran at least two hours after the show whose main character was a doctor.
4) *Mystery, I Think* aired consecutively with the 9:00 show, whose main character was not a journalist.
5) *Slone City*, whose main character was not a lawyer, was shown at some point before *Order and Laws*.

Write a clear, complete, well-organized description of the inferences you made in solving the problem, and write your final solution in the table provided below. The page after this one is left blank so you have sufficient room to organize your thoughts and provide a full answer.

Name of show	Time show was aired	Occupation of main character