For this assignment, you may (and are encouraged to) work in pairs; if you do so, only one member of the pair should submit a solution to the Curator and you must make sure that both students are identified (name and PID) in the submitted solution. You must also write your solutions in such a way that it is clear how each member contributed to deriving the solution.

Prepare your answers to the following questions in Word document or a plain ASCII text file; submissions in other formats will not be graded. Submit your file to the Curator system by the posted deadline for this assignment. No late submissions will be accepted. No other formats will be graded.

You will submit your answers to the Curator System (www.cs.vt.edu/curator) under the heading `OOC04`.

For each question below, the quality of your explanation of how you derived the answer will carry as least as much weight as whether you've stated a correct solution. For each problem, apply one of the heuristics discussed in the course notes, and explain how you applied it.

1. [25 points] Solve the following cryptarithm. Explain exactly how you deduced the solution.

```
  TELL
  TALE
  TELL
  TALE
  ----
  LATE
```

Remember that each letter stands for a different digit (base-10), and that there are no leading zeros.

2. [25 points] Solve the following classic puzzle from Sam Loyd (1841-1911). Explain your logic clearly.

> Here is a puzzle known as the Covent Garden Problem, which appeared in London half a century ago, accompanied by the somewhat surprising assertion that it had mystified the best mathematicians of England:
>
> Mrs. Smith and Mrs. Jones had equal number of apples but Mrs. Jones had larger fruits and was selling hers at the rate of two for a penny, while Mrs. Smith sold three of hers for a penny.
>
> Mrs. Smith was for some reason called away and asked Mrs. Jones to dispose of her stock. Upon accepting the responsibility of disposing her friend's stock, Mrs. Jones mixed them together and sold them of at the rate of five apples for two pence.
>
> When Mrs. Smith returned the next day the apples had all been disposed of, but when they came to divide the proceeds they found that they were just seven pence short, and it is this shortage in the apple or financial market which has disturbed the mathematical equilibrium for such a long period.
>
> Supposing that they divided the money equally, each taking one-half, the problem is to tell just how much money Mrs. Jones lost by the unfortunate partnership?

3. [25 points] A 64-page newspaper (think of a larger Collegiate Times) consists of 16 full sheets of newsprint. One of these sheets is selected at random, and the four page numbers that appear on it are added together. Can you determine the resulting sum? If so, what is it, and why?

4. [25 points] During the pilot episode of the new hit TV show *CSI: Dubuque*, the forensic team finds a well-ripened corpse inside a utility shed that measures 24 feet by 18 feet by 9 feet. Aside from the corpse, the utility shed is occupied by a large number of greenbottle flies; one of the CSI team members makes the statement "There must be 100,000 flies in here!". The senior CSI team member replies "If that is so, then at any instant there must be a group of at least six flies that are all within a distance of 1.1 feet from each other". Is the senior CSI team member correct? Prove your conclusion.