

# Quiz 1

CSE 101, Spring 2002

Issued Thursday, April 4, Due: in class

State your answers legibly and concisely. Your solutions will be graded on correctness, elegance, **clarity** and originality. Your proofs should **avoid getting bogged down in too much detail**. Please note that the work handed in must be your own. **Your handwriting must be legible** and answers must be *in proper order* for full credit to be awarded. Every problem is 25 points.

**Problem 1.** All horses are the same color; we can prove it by induction on the number of horses in a given set. Here is how: "If there is just one horse then it's the same color as itself, so the basis is trivial. For the induction step, assume that there are  $n$  horses numbered from 1 to  $n$ . By the induction hypothesis, horses 1 through  $n - 1$  are the same color, and similarly, horses 2 through  $n$  are the same color. But the *middle* horses 2 through  $n - 1$  can't change color when they are in different groups; these are horses, not chameleons. So horses 1 and  $n$  must be the same color as well. Thus all  $n$  horses are the same color, end of the proof".

*What (if anything) wrong with this reasoning?*

**Problem 2.** What is the sum of the following 101 numbers?

$$100 + 101 + \dots + 199 + 200 = ?$$

**Problem 3.**

$$1 - 2 + 3 - 4 + 5 + \dots + 95 - 96 + 97 - 98 + 99 = ?$$

**Problem 4.** Find  $T_{100}$ , if  $T_1 = 1, T_n = 3T_{n-1} + 2$ .