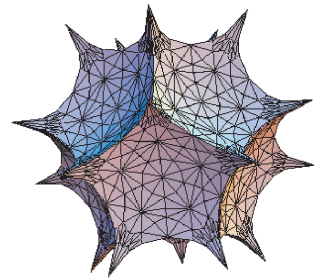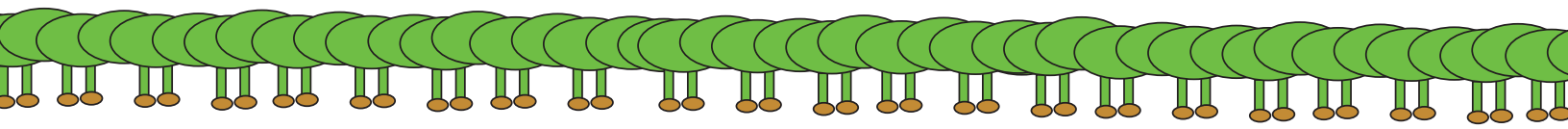# Willamette Math Problem of the Week

April 21 2008
Many Feet, Many Shoes

There are six ways in which a person can put on his or her shoes and socks – for example, left sock, right sock, left shoe, right shoe. In how may ways can a centipede put on its shoes and socks, assuming that it has 100 feet, and can tell them all apart?

Submit all solutions before the appearance of the next problem to Josh Laison in person, by e-mail (jlaison@willamette.edu), or by fortune cookie. The first correct solution gets a prize; all correct solutions get fame and glory. Preference for the prize goes to problem-solvers who haven't won one yet.

Solution to *Higher Elevation*: The building has at most 14 floors.

If there's any floor where only 2 elevators stop, then those two elevators can visit at most 5 other floors each, so the building has 11 floors total. But if 3 elevators stop at each floor, the building could potentially have 16 floors. However, 7 elevators is not enough for 16 floors, since (7 elevators)·(6 stops per elevator)/(3 stops per floor)=14 floors. (Note that 4 stops per floor reduces the number of total floors to 10, so 3 stops per floor is best) Here's an arrangement that works for 14 floors:

Elevator 1 stops at floors 1, 2, 3, 4, 5, 6
Elevator 2 stops at floors 1, 2, 7, 8, 11, 12
Elevator 3 stops at floors 1, 2, 9, 10, 13, 14
Elevator 4 stops at floors 3, 4, 7, 8, 13, 14
Elevator 5 stops at floors 5, 6, 7, 8, 9, 10
Elevator 6 stops at floors 3, 4, 9, 10, 11, 12
Elevator 7 stops at floors 5, 6, 11, 12, 13, 14