

Consider infinitely many two states switches  $S_i$  and infinitely many bulbs  $B_i$ , where  $i$  ranges over the positive integers. The switches control the bulbs in an unknown manner; however for every integer  $n$  there exists a combination of the switches  $S_i$  which turns on the  $n$  first bulbs (and possibly others). Show that there exists a combination of the switches  $S_i$  which turns on simultaneously all the bulbs.

♣ Please **Submit** your solution to

○ Dr. Tirtha Timsina, [ttimsina@gsu.edu](mailto:ttimsina@gsu.edu) or

○ Dr. Christian Avart, [cavart@gsu.edu](mailto:cavart@gsu.edu)

before the deadline: **Friday, January 28th, 7:00PM.**

♣ The WINNER will be awarded with a \$15 gift certificate and will be announced in the NEXT issue.

**Solution to the November Problem of the Month:** Let the line intersect the parabola at two points A and B. Let C be the point on the parabolic arc AB that is furthest from the line.

Find the ratio of the area of the region bounded by the parabola and the line, and the area of the triangle ABC.

Let the line and the parabola intersect at and respectively. Then the area of the bounded region between the line and the parabola is . After rigorous algebra and simplification the integral simply becomes

$$= - \frac{1}{3} \int_{-1}^1 (1-x^2) dx.$$

Now, let the vertices of the triangle ABC be , , (here, A and B are the intersection points and C is any point on the parabolic arc). Area of triangle ABC is then given by A=

.

We want to maximize the area by setting — and solving for  $x$ . This gives us —.

Using this  $x$  value in the formula for area of the triangle ABC, we get —.

Therefore, — — —

**Winner:** Joseph Moravitz