Place 1998 I.D. Sticker Here

FIFTY-NINTH ANNUAL

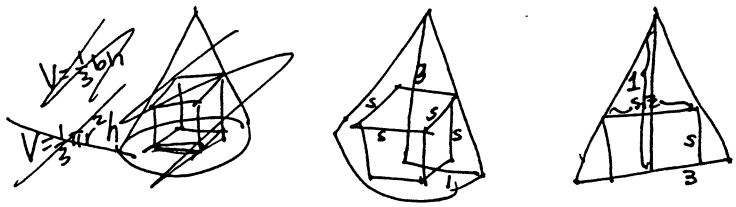
A1

Saturday, December 5
1998

WILLIAM LOWELL PUTNAM MATHEMATICAL COMPETITION

Problem A1

A right circular cone has base of radius 1 and height 3. A cube is inscribed in the cone so that one face of the cube is contained in the base of the cone. What is the side-length of the cube?



The cube is in the cone, and we can see that the bottom of the cone is the bottom of the cube so the top of the cone ~~is the~~ touches at two points. So the two triangles are similar meaning $\frac{1}{3} = \frac{1-s\frac{\sqrt{2}}{2}}{s}$ because $s\sqrt{2}$ is the diagonal of the cube. Writing in one big long paragraph is very hard for the grader to read, so I know the grader will love me. So then the side-length of the cube ~~is~~ can be found.

$s = 3 - \frac{3\sqrt{2}}{2}s \qquad s + \frac{3\sqrt{2}}{2}s = 3$

~~$s + \frac{3\sqrt{2}}{2}s = 3$~~

$s\left(1 + \frac{3\sqrt{2}}{2}\right) = 3$

$s = \frac{3}{1+\frac{3\sqrt{2}}{2}}$

$\frac{3}{1+\frac{3\sqrt{2}}{2}}$

$\frac{s\sqrt{2}}{3+\sqrt{2}} \cdot \frac{3-\sqrt{2}}{3-\sqrt{2}}$

$(3+\sqrt{2})(3-\sqrt{2}) = 9-2 = 7$

$(3\sqrt{2})(3-\sqrt{2}) = 9\sqrt{2}-6$

$\boxed{\frac{9\sqrt{2}-6}{7}}$.

BAD WRITING

Why?

← scratchwork should be done elsewhere

← diagram unclear

← bullet/underline main ideas

← don't babble

← don't write one long paragraph

display your equations; don't embed them in text

how do these relate? are they equal? (connect them with transition phrases so reader can follow argument.)

← what is this? the answer? or a random, boxed number?

↑ what order should the reader follow these thoughts?

If you had to grade 2,000 of this question, would you waste much time reading this solution that is hard to follow? (compare with 'her side)