ASSIGNMENT #8
Due: Monday, 10 March, 2003

Chaser and verse

1. The doglets Solovey and Elvis are playing in the Cartesian coordinate system.[†] Elvis is at the origin and Solovey is 10 m away on the positive x-axis along when Elvis starts running at a constant speed of 10 m/s along the positive y-axis. Solovey gives chase and runs directly towards Elvis at any given instant but always remains 10 m away.[‡] Find an equation in x and y for the curve along which Solovey runs. *[8]*

Hint: At any given instant the line segment between the positions of Solovey and Elvis is 10 m long and tangent to the curve along which Solovey runs.
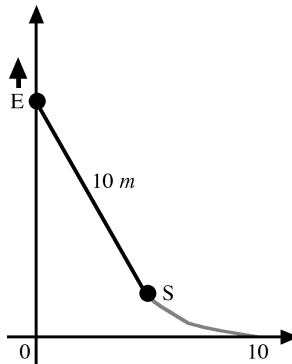
2. Four beetles – A, B, C, and D – occupy the corners of a square $10cm$ along a side. Simultaneously, A begins to crawl directly towards B, B towards C, C towards D, and D towards A. If all four beetles crawl at the same constant rate, their paths will be four congruent spirals that meet in the centre of the square. What distance does each beetle crawl before they all meet? *[2]*

Bonus. The 12th Century A.D. Indian mathematician Bhaskara wrote much of his work in verse. Here is one of his problems[*]:

> The square root of half the number of bees in a swarm
> Has flown out upon a jasmine bush;
> Eight ninths of the swarm has remained behind;
> And a female bee flies about a male who is buzzing inside a lotus flower;
> In the night, allured by the flower's sweet odour, he went inside it
> And now he is trapped!
> Tell me, most enchanting lady, the number of bees.

Restate the problem posed by Bhaskara as an equation and solve it. *[1]*

[†] The doglets are real; the yard has been changed to protect the innocent.

[‡] Elvis is just a bit faster than Solovey . . .

[*] This translation is given in *The Heritage of Thales*, by W.S. Anglin & J. Lambeck, p. 113.