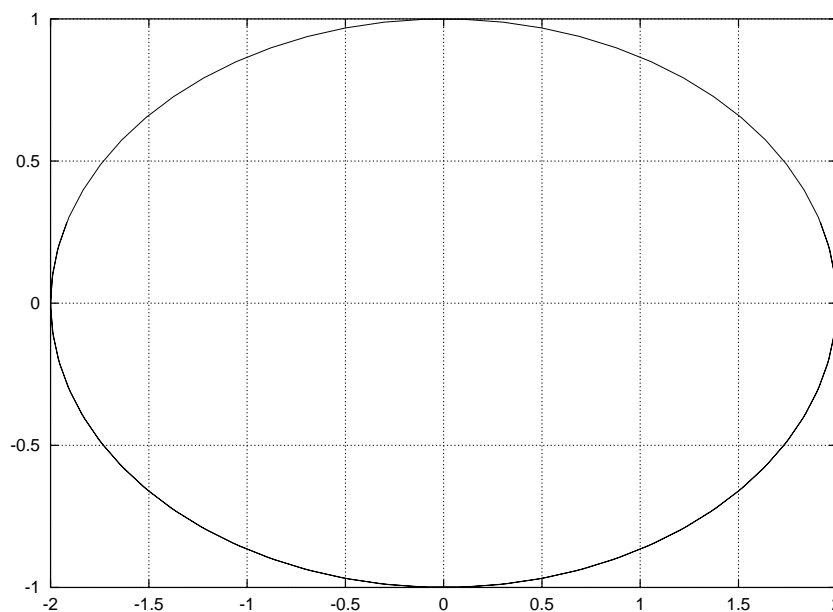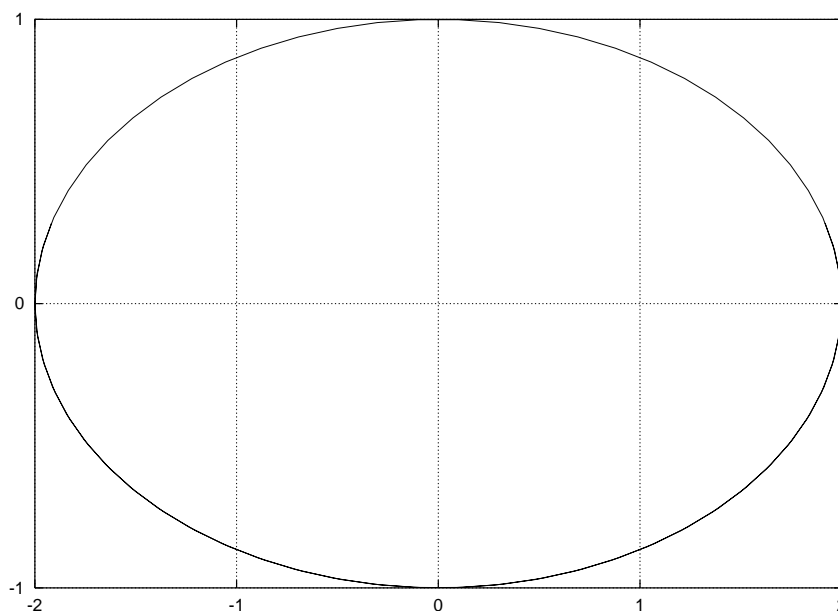Accumulations—Arclength and Area

In groups of two or three, try to estimate the area of the ellipse $x^2 + 4y^2 = 4$ below using the grids provided.

- First, underestimate the area **A1** using the larger (whole units) grid;

- second, overestimate the area **A2** using the larger (whole units) grid;

- third, underestimate the area **A3** using the smaller grid and

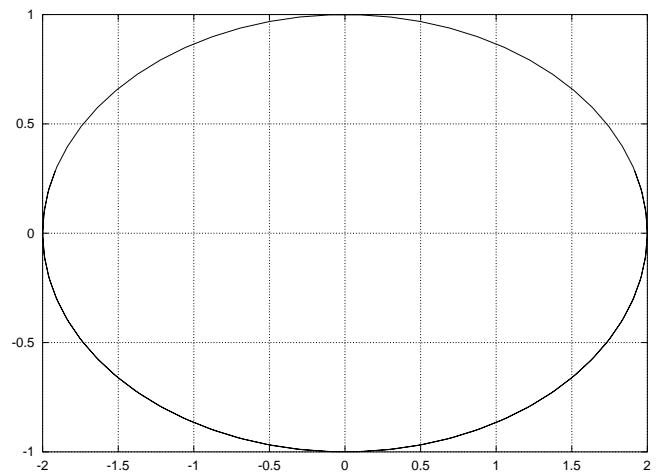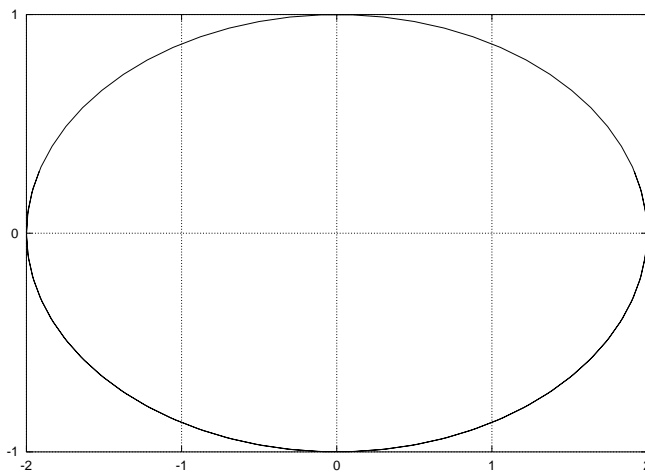- fourth, overestimate the area **A4** using the smaller grid.

$$\leq \qquad \leq \quad \text{EXACT AREA} \quad \leq \qquad \leq$$

QUESTION: How could these estimates be improved? What procedure or tools would you use?
ANSWER:

Arclength
Again in groups of four, estimate the arclength of the ellipse below.

- First, underestimate the arclength **L1** using the coarse grid;

- second, overestimate the arclength **L2** using the coarse grid;

- third, underestimate the arclength **L3** using the finer grid and

- fourth, overestimate the arclength **L4** using the finer grid.

$\leq$ $\leq$ EXACT LENGTH $\leq$ $\leq$

Again, how could these estimates be improved?

Does this suggest as strategy for such accumulation problems?

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