

**Solutions & Comments for Mentors, #6**  
week of November 10, 2014

**Mentors:** Each problem corresponds to Set #3 and builds on the one before it, so each student should start with #1 and go as far as possible.

1. (a) 2.89 (b) 1.7 (c) 225 (d) 15 (e) 2.25 (f) 1.5

2. (a)  $\frac{1}{10}\sqrt{200} = \frac{1}{10}\sqrt{2 \times 100} = \frac{1}{10}\sqrt{2 \times 10^2} = \frac{1}{10}(10)\sqrt{2} = \sqrt{2}$

(b)  $196 < 200 < 225$  so their square roots are in the same order:  $14 < \sqrt{200} < 15$ .

(c) 200 is closer to 196 than it (200) is to 225.

(d)  $\sqrt{2} = \frac{1}{10}\sqrt{200} \approx \frac{1}{10}14 = 1.4$  The three steps use part (a), part (c) and ordinary division.

3. The answers to (a), (b), (c) and (d) are shown on the graph.

(e) Pythagoras tells us that in any right triangle, the square of the hypotenuse equals the sum of the squares of the legs (other two sides). The right triangle that we need is found by connecting  $(\sqrt{2}, \sqrt{2})$ ,  $(\sqrt{2}, 0)$  and  $(0, 0)$ . The length of each leg of this triangle is  $\sqrt{2}$ , so the square of the hypotenuse is  $(\sqrt{2})^2 + (\sqrt{2})^2 = 2 + 2 = 4$ . Since its square is 4, the hypotenuse itself must be 2. From that, we get that  $(\sqrt{2}, \sqrt{2})$  is on the circle of radius 2 centered at the origin.

