Name:

Algebra II
PRACTICE Examination 2

Dr. Paul Bailey
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The examination will contain five problems which are worth 20 points each, and two bonus problems worth an additional 20 points each, for a maximum of 100 points.

Problem 1. (Definitions)
State the precise definition, as given in class, of the following terms.

(a) Rational Number

(b) Real Number
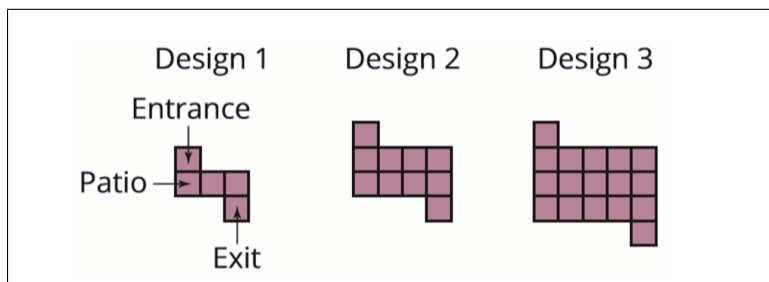
(c) Circle

(d) Parabola

Problem 2. (Solving Equations)
Find all real numbers x which satisfy the following equations. Using correct set notation, write the solution set.

(a) $5x - 2 = 2x + 27$

(b) $5x^2 = 35$

(c) $x^2 - 20x + 100 = 0$

(d) $x^2 - 6x + 9 = 0$

(e) $x^2 - x - 1 = 0$

Problem 3. (Patterns)
Consider the following pattern of floor tiles.

(a) How many tiles will there be in the fourth design?

(b) How many tiles will exist in the nth design?

(c) Is this type of function linear, quadratic, or exponential?

Problem 4. (Equation of a Line and Circle)
Justify your answer by showing your work.

Let $A = (-3, 11)$ and $B = (7, 22)$.

(a) Find the slope of the line through A and B.

(b) Find the point-slope equation of the line through A and B.

(c) Find the slope-intercept equation of the line through A and B.

(d) Find the distance from A to B.

(e) Find the equation of the circle centered at A and passing through B.

Problem 5. (Equation of a Parabola)
Consider the parabola whose equation is $y = 5(x - 3)^2 - 14$.

(a) Find the vertex of the parabola.

(b) Find the y-intercept of the parabola.

(c) Find the x-intercepts of the parabola.

(d) Find the focus of the parabola.

Problem 6. (Bonus)
The locus of the equation $y = x^2 - 8x + 15$ is a parabola.

(a) Find its vertex.

(b) Find its roots.

(c) Find its focus and directrix.

Problem 7. (Bonus)
A rectangular field will be fenced on all four sides. Two make two pens, there is also be a line of fence through the middle of the field, parallel to the shorter side. If 900 feet of fencing are available, what dimensions of the field will produce the maximum area? What is the maximum area?