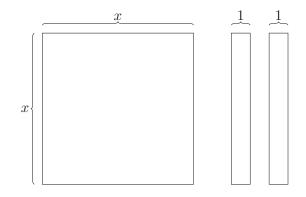1. Suppose you are trying to tile a bathroom floor. Consider the three tiles below:
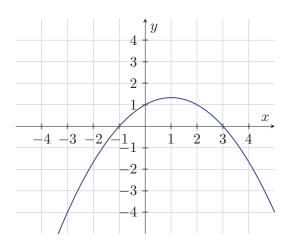

   (a) What is the area of the three tiles shown?

   (b) The three given pieces of tile can *almost* be arranged into a square with sides of length $x + 1$. What is the area of the smallest additional tile you would need in order to make this square?

   (c) Give the area of the three tiles in terms of the area of the larger square.

   (d) Suppose we started with 4 of the above rectangles instead of two. What is the area of the smallest additional tile you would need in order to make a square with sides of length $x + 2$?

   (e) Suppose you were given 6 of the above rectangles instead of two. What is the area of the smallest additional tile you would need in order to make a square with sides of length $x + 3$?

   (f) Suppose you were given b of the above rectangles instead of two. What is the area of the smallest additional tile you would need in order to make a square with sides of length $x + \frac{b}{2}$?

2. Solve the following equations for x by completing the square

   (a) $x^2 + 2x + 2 = 0$ (b) $x^2 + x + 1$ (c) $4x^2 - 7x = 1$

3. The sum of squares of three consecutive integers, x, $x + 1$ and $x + 2$, is 245, what are the integers?

4. The difference between the cubes of two consecutive integers is 271. What are the integers?

5. The discriminant of a quadratic polynomial $f(x) = ax^2 + bx + c$ is $b^2 - 4ac$. Look at the quadratic formula and match the statements on the left with the equivalent statements on the right:

   (a) $b^2 - 4ac < 0$ i The polynomial f has a single real root

   (b) $b^2 - 4ac > 0$ ii The polynomial f has two complex roots

   (c) $b^2 - 4ac = 0$ iii The polynomial f has two real roots

6. Determine how many solutions the equations have and if the solutions are complex or real numbers

   (a) $5x = x^2 + 3$ (b) $19x^2 + \frac{5}{2}x + \frac{1}{12} = 0$ (c) $\frac{3}{4}x^2 + 3x + \pi = 0$

7. Given $x^2 + 3x + k$ find all the values of k which give

    (a) Two real solutions.   (b) One real solution.   (c) Two complex solutions.

8. Below is a graph of a quadratic function of the form $f(x) = ax^2 + bx + c$.

    (a) For which x do we have $f(x) = 0$

    (b) Is the discriminant of f positive, negative or zero?

    (c) What is $f(0)$?

    (d) Which of the following is the equation of f and how do you know?

       i. $f(x) = \frac{1}{2}(x - 1)(x + 3)$ iii. $f(x) = -(x + 1)(x - 3)$

      ii. $f(x) = -\frac{1}{3}(x - 1)(x + 3)$ iv. $f(x) = -\frac{1}{3}(x + 1)(x - 3)$

    (e) Try to construct the equation for the following quadratic graph.