1. Draw the topograph for the form $Q(x,y) = 2x^2 + 5y^2$, showing all the values of $Q(x,y) \le 60$ in the topograph, with the associated fractional labels x/y. If there is symmetry in the topograph, you only need to draw one half of the topograph and state that the other half is symmetric.

2. Do the same for the form $Q(x,y) = 2x^2 + xy + 2y^2$, in this case displaying all values $Q(x,y) \le 40$ in the topograph.

3. Do the same for the form $Q(x,y) = x^2 - y^2$, showing all the values between $+30$ and -30 in the topograph, but omitting the labels x/y this time.

4. For the form $Q(x,y) = 2x^2 - xy + 3y^2$ do the following:

(a) Draw the topograph, showing all the values $Q(x,y) \le 30$ in the topograph, and including the labels x/y.

(b) List all the values $Q(x,y) \le 30$ in order, including the values when the pair (x,y) is not primitive.

(c) Find all the integer solutions of $Q(x,y) = 24$, both primitive and nonprimitive. (And don't forget that quadratic forms always satisfy $Q(x,y) = Q(-x,-y)$.)

5. Determine the periodic separator line in the topograph for each of the following quadratic forms (you do not need to include the fractional labels x/y):

(a) $x^2 - 7y^2$ (b) $3x^2 - 4y^2$ (c) $x^2 + xy - y^2$

6. Using your answers in the preceding problem, write down the continued fraction expansions for $\sqrt{7}$, $2\sqrt{3}/3$, and $(-1+\sqrt{5})/2$.

7. For the following quadratic forms, draw enough of the topograph, starting with the edge separating the $1/0$ and $0/1$ regions, to locate the periodic separator line, and include the separator line itself in your topograph.

(a) $x^2 + 3xy + y^2$ (b) $6x^2 + 18xy + 13y^2$ (c) $37x^2 - 104xy + 73y^2$