

- 1:** (a) Express the (periodic) continued fraction  $x = [1, 3, \overline{1, 1, 2}]$  in the form  $x = \frac{r-\sqrt{d}}{s}$  with  $r, s, d \in \mathbb{Z}^+$ .
- (b) Find the 4<sup>th</sup> convergent  $c_4 = \frac{p_4}{q_4}$  for the continued fraction representation of  $e^2$ . You can use a calculator.
- (c) Express  $\sqrt{43}$  as a continued fraction and find the smallest unit  $u > 1$  in  $\mathbb{Z}[\sqrt{43}]$ .
- 2:** (a) Find all solutions  $(x, y) \in \mathbb{Z}^2$  to Pell's Equation  $x^2 - 29y^2 = 1$ .
- (b) Find all solutions  $(x, y) \in \mathbb{Z}^2$  to the Pell-like equation  $x^2 - 21y^2 = 4$ .