

## Math 342 Tutorial

August 6, 2025

**Question 1.** Find the rational number, expressed in lowest terms, represented by each of the following simple continued fractions. **(a)**  $[10; 3]$ , **(b)**  $[3; 2, 1]$ , **(c)**  $[0; 1, 2, 3]$ , **(d)**  $[2; 1, 2, 1]$ , **(e)**  $[2; 1, 2, 1, 1, 4]$ , **(f)**  $[1; 2, 1, 2]$ , **(g)**  $[1; 2, 1, 2, 1]$ , **(h)**  $[1; 21, 2, 1, 2]$ .

**Question 2.** Find the simple continued fraction expansion, not terminating with the partial quotient of 1, of each of the following rational numbers. **(a)**  $18/13$ , **(b)**  $32/17$ , **(c)**  $19/9$ , **(d)**  $310/99$ , **(e)**  $-931/1005$ , **(f)**  $831/8110$ .

**Question 3.** Let  $f_k$  denote the  $k$ th Fibonacci number. Find the simple continued fraction, terminating with the partial quotient  $f_{k+1}/f_k$ , where  $k$  is a positive integer.

**Question 4.** Let  $[a_0; a_1, \dots, a_n]$  be the simple continued fraction expansion of  $r/s$ , where  $(r, s) = 1$  and  $r \geq 1$ . Show that this continued fraction is symmetric, that is,  $a_0 = a_n, a_1 = a_{n-1}, \dots$ , if and only if  $r \mid (s^2 + 1)$  if  $n$  is odd and  $r \mid (s^2 - 1)$  if  $n$  is even.