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Problem Set #10

Exercise 1: ($\star$) 4 points
Show that if $p \geq 7$ is an odd prime, then

$$\left(\frac{n}{p}\right) = \left(\frac{n+1}{p}\right)$$

for at least one of $n = 2, 4, 5$, or 8.

Exercise 2: ($\star$) 4 points
The prime p for which $x^2 \equiv 13 \bmod p$ has solutions.

Exercise 3: ($\star\star$) 4 points
Compute the continued fraction expansions of $53/18$ and $115/53$.

Exercise 4: ($\star\star\star$) 4 points
If $x = [a_0, ..., a_n, b]$ and $y = [a_0, ..., a_n, c]$ with $b < c$, then $x < y$ if n is odd and $x > y$ is n is even.

Exercise 5: ($\star\star\star$) 4 points
Compute the continued fraction expansion of $\sqrt{17}$ and $\sqrt{19}$ (stop when you find the period), use this to find their first five convergents.

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[1]($\star$) = easy , ($\star\star$)= medium, ($\star\star\star$)= challenge