Homework 2

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Homework 2-1

2.0/2.0 points (graded)

Fermat usually did not write a proof of the results he discovered. Fermat himself did not write a proof of Fermat's Theorem on Sums of Two Squares.

Who first wrote the proof?

- Archimedes of Syracuse
- Leonhard Euler ✔
- Joseph-Louis Lagrange
- Don Bernard Zagier

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Homework 2-2

2.0/2.0 points (graded)

Among the following list of prime numbers, choose all the prime numbers which are the sum of two squares.

- [ ] 71
- [x] 101
- [x] 401
- [x] 2017
- [ ] $2^{74207281} - 1$

✔

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Homework 2-3

2.0/2.0 points (graded)

Fermat's Theorem on Sums of Two Squares is not true for non-prime numbers. Some positive integers can be written as the sum of two squares in two different ways. The following integers are known to be written as the sum of two squares.

Among them, choose all the integers which can be written as the sum of two squares in two different ways.

- [ ] 45
- [ ] 52
- [x] 85
- [ ] 116
- [x] 145

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Homework 2-4

2.0/2.0 points (graded)

Assume that integers $A, B,$ and C satisfy the following:

$2^{1000} \equiv A \pmod{13}$ $\quad 0 \leq A \leq 12$

$21! \equiv B \pmod{23}$ $\quad 0 \leq B \leq 22$

C is the multiplicative inverse to $17 \pmod{81}$ and $1 \leq C \leq 80$.

Find $A, B,$ and C.

$A =$ 3 $B =$ 1 $C =$ 62

$\mathbf{3}$ $\mathbf{1}$ $\mathbf{62}$

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