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# Homework 5

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## Homework 5-1

2.0/2.0 points (graded) The elliptic curve

$$Y^2 = X^3 - 4$$

has only two integral points (S,T) with T>0. One of them is (S,T)=(2,2).

Find the second point.

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# Homework 5-2

2.0/2.0 points (graded)

Let

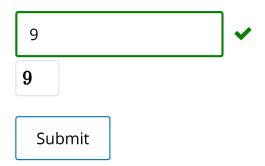
$$E: Y^2 = X^3 + AX + B$$

be an elliptic curve, and let

$$f(q) = q + C_2 q^2 + C_3 q^3 + C_4 q^4 + C_5 q^5 + \dots$$

be a modular form associated with  $m{E}$  by modularity. Assume that  $4A^3+27B^2$  is not divisible by  ${f 13}$ , and  $C_{{f 13}}={f 5}$  .

What is the number of  $\mod 13$  points on E?



# Homework 5-3

2.0/2.0 points (graded)

Many recent results on the BSD Conjecture, including the results of Skinner, Urban, and Zhang, are obtained by applying the methods of a theory generalizing Kummer's work in the 19th century on the special values of the Riemann zeta function and Fermat's Last Theorem.

What is the name of this theory?

Euler Theory	
Kummer Theory	
Takagi Theory	

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## Homework 5-4-1

1.0/1.0 point (graded) Fill in the blank with an integer.

The radical of the ABC triple (5,7,12) is 210

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## Homework 5-4-2

1.0/1.0 point (graded)

Fill in the blank with an integer.

The radical of the ABC triple  $(\mathbf{27}, \mathbf{64}, \mathbf{91})$  is 546

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