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Course > Week 1 > What a... > Proble...
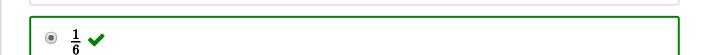
Problem (5-6)

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Problem 5

1/1 point (graded)

Euler became a famous mathematician after solving the Basel problem because many mathematicians at that time failed to solve it. Euler's solution of the Basel problem says the sum of the inverses of the squares divided by the square of π is a rational number.

What is it?

○ 1

○ $\frac{2}{3}$

○ $\frac{1}{4}$

◉ $\frac{1}{6}$ ✔

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ℹ Answers are displayed within the problem

Problem 6

1/1 point (graded)

Euler calculated the special values of $\zeta(s)$ when s is a positive even integer, and proved the ratio $\zeta(2N)/\pi^{2N}$ is a rational number. Choose the correct statement.

○ When Euler solved the Basel problem, he was 17 years old, and 17 is a prime number.

○ Euler also proved $\zeta(N)/\pi^N$ is a rational number for any positive integer N. For example, he proved $\zeta(3) = \pi^3/27$.

○ Euler proved formulae like $\zeta(4) = \pi^4/90$ and $\zeta(6) = \pi^6/945$. These results suggest the numerator of $\zeta(2N)/\pi^{2N}$ is 1.

◉ Kummer discovered the rational number $\zeta(2N)/\pi^{2N}$ has a deep number theoretic meaning. Using his theory, Kummer proved Fermat's Last Theorem in many cases. Kummer's theory was further generalized by Iwasawa in the middle of the 20th century. ✔

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