

DUSO Mathematics League 2016 - 2017

Contest #4.

Calculators are not permitted on this contest.

Part I.

ALGEBRA I

Time Limit: 10 minutes

The word “compute” calls for an exact answer in simplest form.

4 - 1. The sum $5 + 11 + 13 + P$ is prime for some prime P . Compute P .

4 - 2. The quadratic equation $x^2 + bx + c = 0$ has nonzero solutions $x = b$ and $x = c$. Compute the ordered pair (b, c) .

DUSO Mathematics League 2016 - 2017

Contest #4.

Calculators are not permitted on this contest.

Part II.

GEOMETRY

Time Limit: 10 minutes

The word “compute” calls for an exact answer in simplest form.

4 - 3. Two sides of a triangle have length 7 and 11. The third side has length x . Compute the number of integers that could be x .

4 - 4. In $\triangle MTH$, the altitude to \overline{TH} has length 3. The other two altitudes have length 5. Compute $(TH)^2$.

DUSO Mathematics League 2016 - 2017

Contest #4.

Calculators are not permitted on this contest.

Part III.

ALGEBRA II / ADVANCED TOPICS

Time Limit: 10 minutes

The word “compute” calls for an exact answer in simplest form.

4 - 5. Compute the value of $\frac{1}{\log_{60} 30} + \frac{1}{\log_{75} 30} + \frac{1}{\log_6 30}$.

4 - 6. Compute *all* values of k such that the equation $(k + 2)x^2 - kx + 5 = 0$ has exactly one solution.

Author: George Reuter - coachreu@gmail.com - Reviewer: Michael Curry - currymath@gmail.com

DUSO Mathematics League 2016 - 2017

Contest #4.

TEAM ROUND

Calculators are not permitted on this contest.

T-1. In $\triangle ABC$, the sides have lengths 5 cm, 12 cm, and 13 cm. A circle is inscribed in $\triangle ABC$. Compute the area of the circle in sq cm.

T-2. For real numbers x and y , suppose $x + y = 5$ and $x \cdot y = 3$. Compute $x^4 + y^4$.

T-3. Suppose that for some real x , $\cos(\sin^{-1}(\cos(\tan^{-1} x))) = \frac{1}{x}$. Compute x^2 .