Question # 1 Alpha State Bowl

MAO National Convention 2014

Let **A** = The units digit of 

Let **B =** The number of zeros at the end of 2014!

Let **C** = The number of positive integer divisors of 

Determine the value of **A – B + C**.

Question # 1 Alpha State Bowl

MAO National Convention 2014

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Determine the value of **A – B + C**.

Question #2 Alpha State Bowl

MAO National Convention 2014

Consider the points P (-1, 3), Q (-5, 1) and R (3, -3).

Let **A** = area of .

Let **B** =whereis the equation of the parabola that passes through *P, Q,* and *R*.

Let **C** = 

Determine the value of .

Question #2 Alpha State Bowl

MAO National Convention 2014

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Let **A** = area of .

Let **B** =whereis the equation of the parabola that passes through *P, Q,* and *R*.

Let **C** = 

Determine the value of.

Question #3 Alpha State Bowl

MAO National Convention 2014

Consider the following functions:







Let **A** = The number of integers in the domain of 

Let **B** = The sum of all the values of the asymptotes of 

Let **C =** The value of 

Determine the value of **ABC**.

Question #3 Alpha State Bowl

MAO National Convention 2014

Consider the following functions:







Let **A** = The number of integers in the domain of 

Let **B** = The sum of all the values of the asymptotes of 

Let **C =** The value of 

Determine the value of **ABC**.

Question #4 Alpha State Bowl

MAO National Convention 2014

Consider the given values for each of the three parts below: 

Let **A =** The sum of the first 8 terms if the given values are the first three terms of an arithmetic sequence.

Let **B =** The product of the values of *k* that make the given values in geometric progression.

Let **C** = The value of *m* that makes the given values the three roots of 

Determine the value of .

Question #4 Alpha State Bowl

MAO National Convention 2014

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Determine the value of .

Question #5 Alpha State Bowl

MAO National Convention 2014

Let **A** = The sum of the solutions to 

Let **B =** The value of the *k* so that the matrix is not invertible.

Let **C =** The exact simplified value of 

Find the value of **A + B + C**.

Question #5 Alpha State Bowl

MAO National Convention 2014

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Let **B =** The value of the *k* so that the matrix is not invertible.

Let **C =** The exact simplified value of 

Find the value of **A + B + C**.

Question #6 Alpha State Bowl

MAO National Convention 2014

Consider where , , and 

Let **A =** The area of 

Let **B =** The radius of the circumscribed circle about 

Let **C** = The exact value of 

Determine the exact value of .

Question #6 Alpha State Bowl

MAO National Convention 2014

Consider where , , and 

Let **A =** The area of 

Let **B =** The radius of the circumscribed circle about 

Let **C** = The exact value of 

Determine the exact value of .

Question #7 Alpha State Bowl

MAO National Convention 2014

Let **A** = The slope of the line joining two endpoints of the minor and major axes located in the first quadrant of the ellipse given by: 

Let **B** = The product of the slopes of the asymptotes of the hyperbola given by



Let **C** = The area of the triangle whose vertices are the vertex and endpoints of the latus rectum of the parabola given by .

Determine the exact value of .

Question #7 Alpha State Bowl

MAO National Convention 2014

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Determine the exact value of .

Question #8 Alpha State Bowl

MAO National Convention 2014

Let **A** = The sum of the solutions on  to the equation 

Let **B** = The sum of the solutions on  to the equation 

Let **C** = The value of  if 

Let **D** = The period of the function 

Determine the value of .

Question #8 Alpha State Bowl

MAO National Convention 2014

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Determine the value of .

Question #9 Alpha State Bowl

MAO National Convention 2014

Matt and Joe each toss a fair coin with heads on one side and tails on the other.

First assume both players flip their coin exactly three times:

Let **A =** The probability Matt and Joe get an equal number of heads.

Now suppose Matt and Joe alternate flips, starting with Matt. The first to flip a head wins.

Let **B** =The probability that Matt wins.

Determine the value of **A** + **B** as a reduced fraction.

Question #9 Alpha State Bowl

MAO National Convention 2014

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Question #10 Alpha State Bowl

MAO National Convention 2014

Randy drives by exits W, X, Y, Z in that order, along a highway. Exit Y is 2/3 of the way from exit X to exit Z. Exit X is 3⁄4 of the way from exit W to exit Y. Exits W and Z are 72 miles apart.

Let **A =** The number of miles exists Y and Z are apart

Ann’s age is the sum of Bob’s age and Carol’s age. Nine years ago, Ann’s age was the product of Bob’s age and Carol’s age then. Bob is 3 years older than Carol.

Let **B =** Ann’s current age

Xavier travels an average speed of 40 miles per hour home and 60 miles per hour on his way back along the same trip.

Let **C** = Xavier’s average speed in miles per hour for the entire trip.

Determine the value of **C – B – A**.

Question #10 Alpha State Bowl

MAO National Convention 2014

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Let **C** = Xavier’s average speed in miles per hour for the entire trip.

Determine the value of **C – B – A**.

Question #11 Alpha State Bowl

MAO National Convention 2014

Let **A** = The distance between the polar points  and 

Let **B** = The value of 

Let **C** = The *y*-value of the absolute minimum on the graph of the curve given parametrically by 

Determine the value of **A + B + C**.

Question #11 Alpha State Bowl

MAO National Convention 2014

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Determine the value of **A + B + C**.

Question #12 Alpha State Bowl

MAO National Convention 2014

Consider a regular octagon where each side has a length of 4 units.

Let **A =** The number of its diagonals

Let **B** = The measure of one of its interior angles, in degrees

Let **C** = The exact area of this octagon

Determine the exact value of **A + B + C**.

Question #12 Alpha State Bowl

MAO National Convention 2014

Consider a regular octagon where each side has a length of 4 units.

Let **A =** The number of its diagonals

Let **B** = The measure of one of its interior angles, in degrees

Let **C** = The exact area of this octagon

Determine the exact value of **A + B + C**.

Question #13 Alpha State Bowl

MAO National Convention 2014

Let **A** = The number of distinct rearrangements of the letters of the word ADDED

Each week, Fred chooses a day to clean out his car, a day to go to the gym, and either Saturday or Sunday to do his laundry. Tasks can be done on the same day, although, he cannot clean out his car and go to the gym on the same day.

Let **B =**  The total number of ways Fred can arrange his schedule in a week.

Let **C =** The number of ways three players can be chosen from a team of seven.

Determine the value of .

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MAO National Convention 2014

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Determine the value of.

Question #14 Alpha State Bowl

MAO National Convention 2014

Consider a right cone of diameter 12 units whose slant height is 2 more units than the height.

Suppose a cylinder has the same base as the cone.

Let **A** = The height of a cylinder if its volume is the same as the cone.

Now consider a net of the cone consisting of a circle and a sector.

Let **B =** The measure of the central angle of the sector, in degrees.

Determine the value of .

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MAO National Convention 2014

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Determine the value of .