Team Relay
Test #342
Question #0
Seat 1 – Theta

Team Relay
Test #342
Question #0
Seat 2 – Alpha

Team Relay
Test #342
Question #0
Seat 3 – Mu

Question #0
Seat 1 – Theta

A = the units digit of 3^3.

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Question #0
Seat 2 – Alpha

B = $\cos\left(\frac{\boldsymbol{A}\pi}{4}\right)$.

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Question #0
Seat 3 – Mu

C = $\frac{d}{dx}(x^2)$ at $x = \boldsymbol{B}$.

Team Relay
Test #342
Question #1
Seat 1 – Theta

Team Relay
Test #342
Question #1
Seat 2 – Alpha

Team Relay
Test #342
Question #1
Seat 3 – Mu

Question #1
Seat 1 – Theta

A = the area of the ellipse with equation $4x^2 - 8x + 9y^2 + 54y + 49 = 0$.

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Question #1
Seat 2 – Alpha

B = the largest solution of $\tan(2x) - \sqrt{3} = 0$ on the interval $\left[0, \frac{\boldsymbol{A}}{6}\right)$.

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Question #1
Seat 3 – Mu

C = $\int_0^{\boldsymbol{B}} [x]\, dx$
where $[x]$ is the greatest integer less than x.

Team Relay
Test #342
Question #2
Seat 1 – Theta

Team Relay
Test #342
Question #2
Seat 2 – Alpha

Team Relay
Test #342
Question #2
Seat 3 – Mu

Question #2
Seat 1 – Theta

A = the sum of the positive integral factors of 120.

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Question #2
Seat 2 – Alpha

B = the second hand of a clock is ($\boldsymbol{A}$ – 350) centimeters long. Find the speed of the tip of the hand (in cm per second) in terms of π.

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Question #2
Seat 3 – Mu

An airplane flies at a constant altitude of 5 miles toward a point directly over an observer. The speed of the plane is 600 miles per hour. Find the rate (in radians per hour) at which the angle of elevation θ is changing when the angle is $\boldsymbol{B}$.

Team Relay
Test #342
Question #3
Seat 1 – Theta

Team Relay
Test #342
Question #3
Seat 2 – Alpha

Team Relay
Test #342
Question #3
Seat 3 – Mu

Question #3
Seat 1 – Theta

A = the term in the 2nd row, 2nd column of the cofactor matrix of $\begin{bmatrix} 1 & -1 & 0 \\ 1 & 0 & -1 \\ 6 & 2 & -3 \end{bmatrix}$.

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Question #3
Seat 2 – Alpha

B = $\sin(2x)$ if $\cos x = \frac{\mathbf{A+8}}{13}$ and x is in quadrant IV.

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Question #3
Seat 3 – Mu

C = Find the volume of the solid formed by revolving the region bounded by $f(x) = 2 - x^2$ and $g(x) = 1$ about the line $y = \left[-\frac{\mathbf{1}}{\boldsymbol{B}}\right]$ where $[x]$ is the greatest integer less than x.

Team Relay
Test #342
Question #4
Seat 1 – Mu

Team Relay
Test #342
Question #4
Seat 2 – Theta

Team Relay
Test #342
Question #4
Seat 3 – Alpha

Question #4
Seat 1 – Mu

A = the number of ordered pairs of integers that satisfy the equation $\frac{1}{m}+\frac{1}{n}=\frac{1}{10}$.

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Question #4
Seat 2 – Theta

B = coefficient of the second term of $(x-3)^{\boldsymbol{A-13}}$.

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Question #4
Seat 3 – Alpha

C = the value of $\cot 2\theta$ where θ is the smallest positive angle to rotate the coordinate axes in order to eliminate the xy term of the graph $7x^2-\frac{\boldsymbol{B}\sqrt{3}}{2}xy+(25+\boldsymbol{B})y^2-16=0$.

Team Relay
Test #342
Question #5
Seat 1 – Mu

Team Relay
Test #342
Question #5
Seat 2 – Theta

Team Relay
Test #342
Question #5
Seat 3 – Alpha

Question #5
Seat 1 – Mu

A = The value of k such that the area bounded by the line $y = x$ and the graph of the parabola $y = x^2 - x$ is cut in half by a line with equation $x = k$.

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Question #5
Seat 2 – Theta

B = the sum of the squares of the solutions of $x^2 - \sqrt{27}x + (\boldsymbol{A} + 12) = 0$.

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Question #5
Seat 3 – Alpha

C = the cosine of the dihedral angle between the two planes given by $x - 2y + \boldsymbol{B}z = 0$ and $2x + 3y - 2z = 0$.

Team Relay
Test #342
Question #6
Seat 1 – Mu

Team Relay
Test #342
Question #6
Seat 2 – Theta

Team Relay
Test #342
Question #6
Seat 3 – Alpha

Question #6
Seat 1 – Mu

A = the ordinate of the centroid of the region bounded by the x −axis and the graph $y = 3x - x^2$.

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Question #6
Seat 2 – Theta

B = $a - b$ if $\sum_{n=0}^{\infty} \boldsymbol{A}\left(\frac{2}{2+\sqrt{3}}\right)^n = a + b\sqrt{3}$ for rational a, b.

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Question #6
Seat 3 – Alpha

C = the radius of the circle which circumscribes the triangle with points $(2,0)$, $(0,4)$, and $(20\boldsymbol{B},\ 6)$.

Team Relay
Test #342
Question #7
Seat 1 – Alpha

Team Relay
Test #342
Question #7
Seat 2 – Mu

Team Relay
Test #342
Question #7
Seat 3 – Theta

Question #7
Seat 1 – Alpha

A = the period of $f(x) = \frac{\sin(67x)+\sin(x)}{\cos(67x)+\cos(x)}$.

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Question #7
Seat 2 – Mu

B = the total distance traveled by the particle whose velocity is given by $v(t) = \cos(2t)$ from $t = 0$ to $t = \frac{\pi^2}{\boldsymbol{A}}$.

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Question #7
Seat 3 – Theta

C = Smallest positive integer n such that

$$\sum_{k=1}^{n} [\sqrt{k}] > \boldsymbol{B}.$$

where $[x]$ is the floor of x.

Team Relay
Test #342
Question #8
Seat 1 – Alpha

Team Relay
Test #342
Question #8
Seat 2 – Mu

Team Relay
Test #342
Question #8
Seat 3 – Theta

Question #8
Seat 1 – Alpha

A = the number of distinct solutions to $4\sin^2\theta\cos\theta + \sqrt{3}\sin\theta - \sin 2\theta - \frac{\sqrt{3}}{2} = 0$ on the interval $\theta \in [0,2\pi)$.

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Question #8
Seat 2 – Mu

B = the maximum value of $f(x) = \frac{\boldsymbol{A}}{\csc(x)} + \frac{\boldsymbol{A}+1}{\sec(x)}$.

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Question #8
Seat 3 – Theta

C = the minimum degree measure of each interior angle of a regular convex polygon with at least 10**B** diagonals.

Team Relay
Test #342
Question #9
Seat 1 – Alpha

Team Relay
Test #342
Question #9
Seat 2 – Mu

Team Relay
Test #342
Question #9
Seat 3 – Theta

Question #9
Seat 1 – Alpha

A = the largest real solution to $f(x) = x^4 - 4x^3 - 7x^2 + 34x - 24$.

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Question #9
Seat 2 – Mu

B = smallest integer k such that $3x^4 + 8x^3 - 48x^2 + k + \boldsymbol{A} \geq 0$ for all real x.

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Question #9
Seat 3 – Theta

C = $r^3 + \frac{1}{r^3}$ if r is a root of $x^2 - kx + 1 = 0$ where k is the sum of digits of $|\boldsymbol{B}|$.