

52nd Lee Webb Math Field Day

California State University, Bakersfield
Department of Mathematics

March 1, 2025

Varsity Math Bowl

Varsity Math Bowl Round 1 Sample Question

2025 is not a prime. What is the smallest prime factor of 2025?

Varsity Math Bowl Round 1 Question 1

What is the largest prime factor of 2025?

Varsity Math Bowl Round 1 Question 2

The first triangular numbers are 1, 3, 6, 10, 15, 21, 28, What are the last two digits of the 2025th triangular number?

Varsity Math Bowl Round 1 Question 3

Simplify:

$$\frac{\frac{1}{3} - \frac{2}{15}}{\frac{2}{15} - \frac{1}{9}}$$

Varsity Math Bowl Round 1 Question 4

Evaluate

$$\frac{2^{2^3}}{2^{2^2}}$$

Varsity Math Bowl Round 1 Question 5

After shuffling, what is the probability that the 2 of hearts comes before the 3 of hearts and that the 3 of hearts comes before the 4 of hearts?

Varsity Math Bowl Round 1 Question 6

How many real solutions does the equation

$$x^8 - x^4 = 6$$

have?

Varsity Math Bowl Round 1 Question 7

This year is a perfect square. How many years away is the next year that is a perfect square?

Varsity Math Bowl Round 1 Question 8

Today, March 1st, is a Saturday. What is the day of the week on March 1st of the next leap year?

Varsity Math Bowl Round 1 Question 9

The average of the numbers 6, 7, 8, 9, $4x$ is x . What is the value of the average minus the median?

Varsity Math Bowl Round 1 Question 10

Simplify:

$$\frac{20^{25} + 20^{25} + 20^{25} + 20^{25} + 20^{25}}{4^{24} \cdot 5^{25}}$$

Varsity Math Bowl

Round 2

Varsity Math Bowl Round 2 Sample Question

If $\frac{20}{25}$ is written in reduced form, what is the sum of the numerator and denominator?

Varsity Math Bowl Round 2 Question 1

Simplify to reduced m/n form:

$$2 + \frac{1}{0 + \frac{1}{2 + \frac{1}{5}}}$$

Varsity Math Bowl Round 2 Question 2

Hearts is one of the 4 suits in a deck of cards. From just the hearts, how many hands of 4 cards are possible?

Varsity Math Bowl Round 2 Question 3

Given $\angle BAD$ and $\angle BAC$ where $\vec{AC}$ is between $\vec{AB}$ and $\vec{AD}$. If $\angle BAD = 47^\circ 45'$ and $\angle CAD = 29^\circ 58'$, find the measure of $\angle BAC$.

Varsity Math Bowl Round 2 Question 4

When the trinomial $(20 + 25x^2 + x^4)^8$ is expanded, what is the coefficient of the x^{13} term?

Varsity Math Bowl Round 2 Question 5

At *Acme College*, 200 students enrolled in both Biology I and Chemistry I. Of these students, 76 got an A in Biology, 57 got an A in Chemistry - with 32 getting an A in both classes. How many students did not get an A in neither of the two classes?

Varsity Math Bowl Round 2 Question 6

Using the standard restricted domain for $\sin(x)$ to define $\cos^{-1}(x)$, evaluate

$$\cos^{-1}\left(\cos\left(-\frac{\pi}{3}\right)\right)$$

.

Varsity Math Bowl Round 2 Question 7

Suppose $f(x + 1) = x$ and $g(x) = 1 - x$.
What is

$$g(f(g(f(1))))?$$

Varsity Math Bowl Round 2 Question 8

A triangle has side lengths of 10, 18, and x , where x is an integer. How many possible values are there for x

Varsity Math Bowl Round 2 Question 9

What is the smallest number that has exactly 5 factors, including 1 and itself?

Varsity Math Bowl Round 2 Question 10

How many points, with integer coordinates, are on the circle with equation $x^2 + y^2 = 100$.

Round 3

Varsity Math Bowl Round 3 Sample Question

What is distance between $\frac{52}{2025}$ and the nearest integer? Answer as a fraction in lowest terms.

Varsity Math Bowl Round 3 Question 1

Convert 2025 base 10 into base 8.

Varsity Math Bowl Round 3 Question 2

Let

$$f(x) = \sum_{n=1}^3 xn^n$$

What is $f(10)$?

Varsity Math Bowl Round 3 Question 3

Shelly is getting A's in Math, Chemistry, and English, and B's in History and German. Shelly has no idea what the grade in Art class will be. With a standard 4 point scale, what grade is needed to maintain a 3.0 GPA (answer as a letter grade or a number on the 4 point scale).

Varsity Math Bowl Round 3 Question 4

How many quadrants does the graph of

$$y = -\log_{10}(x^4)$$

go through?

Varsity Math Bowl Round 3 Question 5

There is a bag of marbles. When counting in groups of 5, there are 2 left. When counting in groups of 7, there are 5 left. Knowing that there are less than 100 marbles, and that the number of marbles is prime, how many marbles are there?

Varsity Math Bowl Round 3 Question 6

Simplify:

$$256^{0.16} \cdot 256^{0.09}$$

Varsity Math Bowl Round 3 Question 7

Suppose α is an acute angle and $\sin \alpha = \frac{3}{8}$, then what is $\cot \alpha$?
Answer in simplified radical form.

Varsity Math Bowl Round 3 Question 8

In how many ways can 52 cents be made with quarters, dimes, nickels, and pennies?

Varsity Math Bowl Round 3 Question 9

Evaluate

$$\lim_{x \rightarrow \infty} e^{\frac{1}{\ln x}}.$$

Varsity Math Bowl Round 3 Question 10

Let $f(x) = (x^3 - 3x + 2)(x^2 + x + 3)$.

What is the sum of the roots of $f(x) = 0$?

Round 4

Varsity Math Bowl Round 4 Sample Question

Calculate

$$2025\left[\sin\left(\frac{52}{2025}\right)\right].$$

Here $[x]$ represents the greatest integer function.

Varsity Math Bowl Round 4 Question 1

Calculate

$$2025 \cos([|\sin(\frac{2025}{52})|]),$$

with $[x]$ representing the greatest integer function.

Varsity Math Bowl Round 4 Question 2

If two standard dice are rolled, what is the probability that the product of the two values shown is a square number? Answer should be in the form of a fraction in lowest terms.

Varsity Math Bowl Round 4 Question 3

Evaluate

$$\cos\left(\tan^{-1}\left(\frac{12}{5}\right)\right)$$

Varsity Math Bowl Round 4 Question 4

When the trinomial $(2025 + 25x^5 + 52x^7)^{10}$ is expanded, what is the coefficient of the x^{18} term?

Varsity Math Bowl Round 4 Question 5

What is the first digit after the decimal point in

$$\frac{19^{25} - 1}{9}?$$

Varsity Math Bowl Round 4 Question 6

An $n \times n$ magic square contains the numbers $1, 2, \dots, n^2$ in an $n \times n$ square grid, where each row and each column has the same sum. What's the sum of each row in a 6×6 magic square?

Varsity Math Bowl Round 4 Question 7

Let p_n be the n th prime number.
Estimate the value of

$$\sum_{n=1}^{\infty} \frac{1}{p_n!}$$

to two significant digits.

Varsity Math Bowl Round 4 Question 8

Find the last two digits of

$$\sum_{n=1}^{2025} n!$$

Varsity Math Bowl Round 4 Question 9

Evaluate

$$1 + \int_{-2}^2 \frac{x^{2025} + x}{x^{2026} + 1} dx$$

Varsity Math Bowl Round 4 Question 10

Let $f(x) = \sum_{n=0}^{\infty} \frac{x^n}{n!}$. Evaluate $f(\ln 2)$.

The End

Please be patient while we calculate the scores.

Closing Ceremony to commence shortly