

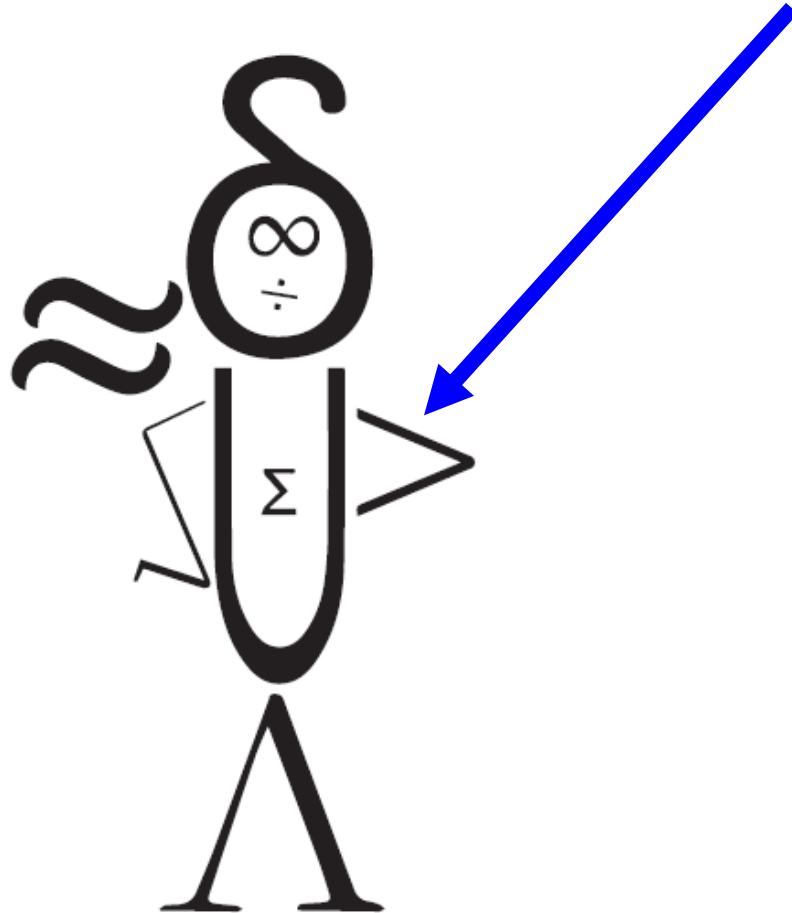
2016

**Calhoun Community College
Mathematics Tournament**

CIPHERING

PRACTICE Question 1

Write the meaning of the mathematical symbol shown on “The Significant Figure” [here](#):



Answer to PRACTICE Question 1

GREATER THAN

PRACTICE Question 2

If x and y are non-zero and $x^2 + y^2 = xy$,

what is the value of $\frac{x}{y} + \frac{y}{x}$?

Answer to PRACTICE Question 2

1

Question 1

What is the third term in the expansion of

$$\left(\frac{x}{2} + 4\right)^5 ?$$

Answer to Question 1

$$20x^3$$

Question 2

Evaluate the following limit: $\lim_{x \rightarrow 0} \frac{\sin 6x}{3x}$

Answer to Question 2

2

Question 3

A password to log into a computer system is to consist of 3 letters followed by 3 digits. Determine how many different passwords are possible if the first letter must be a vowel (a, e, i, o, u), the first digit cannot be 0, and repetition of letters and digits is not permitted.

Answer to Question 3

1,944,000

Question 4

What is the largest solution to the equation

$$-12x^3 + 20x^2 = -37x + 30?$$

Answer to Question 4

$$\frac{5}{2}$$

Question 5

The points $(5, -1)$, $(-2, 8)$, and $(6, n/7)$ are collinear.

What is the value of n ?

Answer to Question 5

-16

Question 6

The gelatin desserts that Aunt Bethany brings to the family holiday dinner are each in the shape of a hemisphere.

If the diameter of each individual dessert is 5 inches, what is the exact volume of gelatin in all 12 desserts? (The proper unit must be included with your answer.)

Answer to Question 6

$$125\pi \text{ in.}^3$$

Question 7

In triangle ABC , $AB = 9$, $BC = 10$ and $AC = 11$.

What is the cosine of angle B ?

Answer to Question 7

$$\frac{1}{3}$$

Question 8

At what real value(s) of x , (if any), does the graph of the function

$$f(x) = x^4 - 108x + 1$$

have a horizontal tangent?

Answer to Question 8

3

Question 9

What is the $\sin\left(2\arccos\frac{5}{13}\right)$?

Answer to Question 9

$$\frac{120}{169}$$

Question 10

If the length of a diagonal of a square is

$$2x + 2y,$$

what is the simplified area of the square?

Answer to Question 10

$$2(x + y)^2$$