Math 75 Daily Quiz 3
Burger

Name Key

6pts You must use Calculus to solve the problems. No guess and check.

1. A right triangle with hypotenuse of $5\sqrt{3}$ inches is revolved about one of its legs to generate a cone. What is volume of the cone of the greatest possible volume?

$h^2 + r^2 = (5\sqrt{3})^2 = 75$

$25 \cdot 3$

$V_{cone} = \frac{1}{3}\pi r^2 \cdot h = \frac{1}{3}\pi(75 - h^2)\cdot h$

$= \frac{1}{3}\pi[75h - h^3]$

Set $V'(h) = 0 = \frac{1}{3}\pi[75 - 3h^2] \longrightarrow$ $75 - 3h^2 = 0$

$75 = 3h^2$

$h^2 = 25 \rightarrow h = 5$ throw -5 away.

$5^2 + r^2 = 75$

$r^2 = 50 \rightarrow r = \sqrt{50} = 5\sqrt{2}$

So $V_{max} = \frac{1}{3}\pi(50)(5) = \frac{250\pi}{3}$

2. The sum of two numbers is 10. The sum of their cubes is a minimum. What are the two numbers?

$x + y = 10 \qquad x^3 + y^3 = S$

let $y = 10 - x \rightsquigarrow S(x) = x^3 + (10-x)^3$

$S'(x) = 3x^2 + 3(10-x)^2(-1)$

$= 3x^2 - 3[100 - 20x + x^2] = 0$

$\rightsquigarrow x^2 - 100 + 20x - x^2 = 0$

$\rightsquigarrow 20x = 100$

$x = \frac{100}{20} = 5 \rightarrow y = 10 - 5 = 5$

5, 5