Bergen County Mathematics League

Problem Author: Steve Conrad, www.mathleague.com

Problem Editor: Dan Flegler, www.mathleague.com

Brief Contest Solutions #2 — **2011-2012**

1) The non-water component weighs 5 pounds. For it to be 10 percent of the dehydrated melon, that melon must weigh $\boxed{50}$ pounds

2) $815 - 527 = 288$
$527 - 383 = 144$
} g.c.d of 144 and 288 is $\boxed{144}$

3) From 1 through 999, a 0 will appear in the units' place 99 times and in the tens' place 90 times. Since 1000 has 3 zeros, the total number of times that 0 will appear as a digit is $99 + 90 + 3 = \boxed{192}$.

4) The upper region's area is $\frac{\pi(3.5)^2}{2} - \frac{\pi(1.5)^2}{2} + \frac{\pi(2)^2}{2} = 7\pi$

The lower region's area is $\frac{\pi(3.5)^2}{2} + \frac{\pi(1.5)^2}{2} - \frac{\pi(2)^2}{2} = \frac{21\pi}{4}$

$\frac{\text{lower unshaded area}}{\text{upper shaded area}} = \frac{\frac{21\pi}{4}}{7\pi} = \boxed{\frac{3}{4}}$

5) $x = \frac{y-4}{y+3} = 1 + \frac{-7}{y+3} \Leftrightarrow (x-1)(y+3) = -7$, which is centered at $\boxed{(1,-3)}$.

6) Since an odd number of integers are picked, the number 20 must have been picked. If 20 is to be the median, the other 24 must be evenly divided between the numbers below and above 20.

The probability $= \boxed{\frac{\binom{19}{12}\binom{15}{12}}{\binom{35}{10}}} = \frac{\binom{19}{7}\binom{15}{3}}{\binom{35}{10}} = \frac{1235}{9889} = 0.124886237233\ldots$