



Knights of Pi Math Tournament – Dec. 4, 2010
Probability & Potpourri 7th/8th

1	If I flip 3 coins, what is the probability of obtaining exactly 2 heads? (Give your answer as a fraction.)
2	I have 117 single socks; they are of colors: green, blue, red, and white. And I know I have at least 17 of each color. If I randomly draw socks from my dresser, what is the minimum number I have to draw to ensure I have a pair of each color?
3	What is the sum of the least common multiple and the greatest common divisor of the numbers 21 and 27?
4	What is the sum of the coefficients of all the terms in the expansion of $(1 + x)^4$?
5	Matthew is locked up in a room with a single die. He is instructed to roll the die once at a random time between 3:00pm and 4:00pm. What is the probability that Matthew has rolled a 6 by the time it is 3:45pm?
6	How many ordered triplets of integers (x, y, z) satisfy the inequality $x^2 + y^2 + z^2 < 3$?
7	Jonathan's defective calculator has only 3 keys: $[+1]$, $[+2]$, and $[\cdot 3]$. (add 1, add 2, multiply by 3, respectively). Once each of these keys are pressed, the calculation takes place immediately. If the calculator starts with the number 2, what is the least number of keystrokes that would obtain the number 200?
8	Consider the set $y = \{1, 11, 1111, 11111111, \dots, (128 \text{ one's})\}$. How many elements of set y are prime?
9	What is the probability that a randomly chosen factor of 70^{99} is also a factor of 70^{19} ?
10	Simplify $\frac{1+3+5+\dots+99}{2+4+6+\dots+100}$.
11	Follow the following instructions very carefully and in order. Be clever, and do not be fooled. Ignore all commands that appear in bold if they come after this sentence. My dog is named Answer. Write the numbers "1 through 10" on your paper. The answer to this puzzle is "{what}" Leap out of your chair and scream, "I LOVE PI" and please have your parents drive you home. If you reached this point, congratulations! You know how to follow instructions. From now on, only follow commands preceded by "Simon says." (Except this one of course.) Simon says to ignore all text that appears upside down. Simon says disregard the next three sentences. `səɹuɛɹəz ɔwɪ ɪxəɪ əɪt ɪrəɹɪdɪs LEAVE THE BOX COMPLETELY BLANK, WE WILL MARK YOUR ANSWER CORRECT ONLY IF IT IS BLANK! Compute the sum: $1^3 + 2^3 + 3^3 + 4^3 + 5^3$, this answer will be used for a later question. Simon says write the answer on your paper, but don't be tricked! Simon says the answer is not "the answer," nor is it "two words."

12	<p>The following is an anagram:</p> <p style="text-align: center;">Club Me Pen Mr Ox</p> <p>The answer is two words. <i>i</i> hope you have fun!</p>																																																																																																				
13	<p>What word could fill the blank?</p> <p style="text-align: center;">Magnesium Uranium Lawrencium Tin Iron Potassium _____ Yttrium</p>																																																																																																				
14	<p>Find the next number in the sequence of numbers:</p> <p style="text-align: center;">325, 263, 642, 436, 374, 753, 547, 485, __</p>																																																																																																				
15	<p>Minesweeper is a game where players have to find mines in a grid of squares. The mines are predetermined and scattered randomly in the grid. Numbers indicate the number of mines directly bordering that particular square (adjacently and diagonally). A blank square implies zero adjacent mines. The player will have to either reveal or flag each square. If a mine is revealed, the player loses! Therefore, the player must place a flag on every square which hides a mine in order to win.</p> <p>In the following Minesweeper grid, given that there are 5 mines remaining to be flagged, how many of the 8 cells can be determined?</p> <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th></th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>F</th> <th>G</th> <th>H</th> <th>I</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td></td> <td>1</td> <td>?</td> <td>?</td> <td>?</td> <td>?</td> </tr> <tr> <td>2</td> <td>1</td> <td>↖</td> <td>1</td> <td>1</td> <td>2</td> <td>?</td> <td>?</td> <td>?</td> <td>?</td> </tr> <tr> <td>3</td> <td>1</td> <td>1</td> <td>2</td> <td>2</td> <td>↖</td> <td>3</td> <td>2</td> <td>2</td> <td>1</td> </tr> <tr> <td>4</td> <td></td> <td></td> <td>1</td> <td>↖</td> <td>2</td> <td>2</td> <td>↖</td> <td>2</td> <td>1</td> </tr> <tr> <td>5</td> <td></td> <td></td> <td>1</td> <td>2</td> <td>2</td> <td>2</td> <td>1</td> <td>3</td> <td>↖</td> </tr> <tr> <td>6</td> <td></td> <td></td> <td></td> <td>1</td> <td>↖</td> <td>1</td> <td></td> <td>2</td> <td>↖</td> </tr> <tr> <td>7</td> <td></td> <td></td> <td></td> <td>1</td> <td>1</td> <td>1</td> <td></td> <td>1</td> <td>1</td> </tr> <tr> <td>8</td> <td>1</td> <td>1</td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>9</td> <td>1</td> <td>↖</td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		A	B	C	D	E	F	G	H	I	1	1	1	1		1	?	?	?	?	2	1	↖	1	1	2	?	?	?	?	3	1	1	2	2	↖	3	2	2	1	4			1	↖	2	2	↖	2	1	5			1	2	2	2	1	3	↖	6				1	↖	1		2	↖	7				1	1	1		1	1	8	1	1	1							9	1	↖	1						
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