WSMA Math Bowl – March 2, 2013

College Bowl Round 3 Proctors' Answer Sheet

1	Square ABCD in the coordinate plane has three of its vertices at points A(1, 3), B(5, 7) and C(9, 3). Find the coordinates of vertex D.	(5,-1)
2	If $f(x+y+z) = f(x) + f(y) + f(z) + 1$, $f(1) = \pi$, and $f(\sqrt{5}-2) = 3$, find the value of $f(\sqrt{5})$.	2π+4
3	There are 10 Guardian Angels and 12 Demons under the temple of WSMA. Two beings, chosen among them, are selected to be sent to Evan. When Evan asks truth-telling WSMA members if at least one Demon was selected, the members reply yes. What is the probability that both selected beings are Demons?	11/31
4	3 Siege Tanks attack 12 Zerglings, killing 2 of them and damaging the rest so that the remaining 10 Zerglings have unequal amounts of health remaining. How many ways can Arjun divide the remaining Zerglings into 3 groups of 3, 3 and 4 Zerglings, respectively?	4200
5	If $1 < x < 3$, simplify $\sqrt{1-2x+x^2} + \sqrt[4]{(x^2-6x+9)^2}$.	2
6	Solve the following equation for x: $987x^2 - 251x - 736 = 0$.	1, -736/987
7	Let *A* be the number of sides of a regular polygon with exterior angles measuring 36 degrees and let *B* be the sum of the infinite geometric series with initial value $\frac{1}{2}$ and common ratio 1/2. Find *A*+*B*	11
8	Evaluate the following: $1^3 + 2^3 + 3^3 + \cdots + 15^3$	14400
9	The line $y = 2x + b$ passes through the points $(-1, 3)$ and $(a, -3)$. Find the value of $\frac{b}{a}$	-5/4
Extra	At 7 p.m., Brian realizes he needs to prepare a presentation for 8 a.m. the next day. His productivity is currently 90% and it decreases to 75% after 10 p.m. and it decreases again to 50% after 3 a.m. If he starts working right away and finishes at 8 a.m., how much time would he have saved by not procrastinating and working at 100% productivity? Express your answer as a decimal.	4.05 hours