



The Mandelbrot Competition

Sample Individual Test with Answers

1. If the five digit number $5DDDD$ is divisible by 6, then find the digit D .		1
2. A function $f(n)$ defined for all positive integers has the property that $f(m)+f(n)=f(mn)$ for any positive integers m and n . If $f(2)=7$ and $f(3)=10$, then calculate $f(12)$.		1
3. Jeff types $\cos^{-1}(\sqrt{\text{RAND}})$ on his calculator to take the arccosine of the square root of a random number between 0 and 1. What is the probability that the result is between 30 degrees and 45 degrees?		2
4. Find the real solution to the equation $x^3+3x^2+3x=3$.		2
5. Ed is thinking of an integer from 1 to 25 inclusive. Eehern asks him if the number is a multiple of three, if it is a perfect cube, and if it is a prime. After receiving the replies Eehern can deduce Ed's number. What is that number? (Note that 1 is not a prime.)		2
6. What is the minimum possible value of $(a/2b) + (b/4c) + (c/8a)$, where a , b , and c are positive real numbers?		3
7. Two pedestrians standing 10 feet and 40 feet away from the base of a billboard structure have equivalent views of the billboard, meaning that the angles marked in the diagram are congruent. If the billboard is 9 feet tall, what is its height h off the ground?		3

SCORE: