CSCI 140 Dr. Yessick Programming Assignment 1 Due Date: Mon, Feb 8, 2010

MRSI – Multiple Rounds Simultaneous Impact

Background: http://www.youtube.com/watch?v=WghCzSKySxA

Modern artillery use computers to aid in firing. By varying propellant in artillery shells multiple trajectories can be created for any target. Computer generated firing plans can allow Howitzers to fire 8 shells, sequentially at 8-12 second intervals, that will land virtually simultaneously on one target.

Create a program to assist MRSI calculations. Max velocity of a shell is 1660m/s. Given a firing range of up to 40km, give a firing plan for 8 shells to be fired at 12 second intervals. The firing plan requires two components, the shell velocity and the firing angle. You will also provide the horizontal and vertical velocity vectors.

The output of your program will be used to compute the amount of propellant needed but you are not required to compute this value.

For purposes of calculation assume the gravitational constant, g, is 9.8 m/s^2 and that wind resistance is negligible.

Input:
Range in kilometers (km). __
Output:
1. 0sec. velocity: __(m/s) at angle __(degrees) vx: __(m/s) vy: __(m/s).
2. 12sec. velocity: __(m/s) at angle __(degrees). vx: __(m/s) vy: __(m/s).
3. 24sec. velocity: __(m/s) at angle __(degrees). vx: __(m/s) vy: __(m/s).
4. 36sec. velocity: __(m/s) at angle __(degrees). vx: __(m/s) vy: __(m/s).
5. 48sec. velocity: __(m/s) at angle __(degrees). vx: __(m/s) vy: __(m/s).
6. 60sec. velocity: __(m/s) at angle __(degrees). vx: __(m/s) vy: __(m/s).
7. 72sec. velocity: __(m/s) at angle __(degrees). vx: __(m/s) vy: __(m/s).
8. 84sec. velocity: __(m/s) at angle __(degrees). vx: __(m/s) vy: __(m/s).

Formulas: (Vy is vertical and Vx is horizontal velocity.)

AirTime = 2 (Vy / g)
CruiseTime = TargetRange / Vx
$ShellVelocity^2 = Vx^2 + Vy^2$

Your program will be graded for style as well as correctness. Below are some key elements that will cause deductions in your submission.

Key	Usual Deductions (pts or %)
A. Missing statement of purpose, an overall summary	8
B. Inadequate commenting	8
C. Names are not meaningful	8
D. Indentation does not indicate program structure	4
E. Program will not compile	100
F. Program produces incorrect results	20–100
G. Insufficient testing (program branch never executed, borderline case not tested, prescribed test case results not submitted)	4–20 (per offense)
H. Output not annotated to demonstrate correctness of results	8
I. Program solves wrong problem	8–100
J. Algorithm inefficient or difficult to follow	10
K. Use of unnamed constant	4
L. Lack of attribution to contributers and sources.	100
M. Late	10 / day