**Problem #1:**

At the beginning of the quarter, we analyzed the trajectory of a baseball in Excel. The equations of motion for a projectile launched with an initial velocity, *vo*, at an angle, **, above the horizontal are repeated here:

Use values of initial velocity, *vo* = 200 ft/s and an angle, ** = 20° for your solution.

***Question*:** What is the maximum height of the projectile? How far (horizontally) does it travel before hitting the ground?

**Answer:** The maximum height of the projectile is 72.6475 feet and travels approximately 789.3418 feet horizontally before hitting the ground.

**Problem #2:**

Create two arrays, *a* & *b*, each containing the integers from 1 to 20. Write a Matlab script to determine how many integer numbers, *c*, exist which satisfy the Pythagorean equality: *a2* + *b2* = *c2* (for all of the values 1 – 20 of *a* & *b* contained in the arrays). Output all combinations of integers *a*, *b* & *c* which satisfy the Pythagorean equality to the command window.

**Answer:**

Output table for a^2 + b^2 = c^2

intabc =

Columns 1 through 10

3 4 5 6 8 8 9 12 12 12

4 3 12 8 6 15 12 5 9 16

5 5 13 10 10 17 15 13 15 20

Columns 11 through 14

15 15 16 20

8 20 12 15

17 25 20 25

% Clair Cunningham PSWC-01 Homework #9

%% Problem #1

% Calculate and store height h(t), and x(t) in time increments of 0.1

% h(t) = vo\*t\*sin(theta)-1/2\*g/t^2

% x(t) = vo\*t\*cos(theta)

%initialize variables

clc; close all; clear all;

num = 1;

t(1) = 0;

g = 32.2;

%get user input

vo = input('Please enter the initial velocity in ft/s: ');

theta = input('Please enter the angle in degrees: ')\*pi()/180;

%calculates next value of h(t)

nexth(num) = vo\*(0.1)\*sin(theta)-1/2\*g\*(0.1)^2;

%loops until the projectile hits the ground h(t) = 0

while nexth(num)>0

num = num + 1;

t(num) = t(num-1) +0.1;

h(num) = vo\*(t(num))\*sin(theta)-1/2\*g\*(t(num))^2;

x(num) = vo\*t(num)\*cos(theta);

nexth(num) = vo\*(t(num)+0.1)\*sin(theta)-1/2\*g\*(t(num)+0.1)^2;

end

%Outputs values

%Sets and Gets the Screen size and dimension type

set(0,'Units','pixels');

scrsz = get(0,'ScreenSize');

%Creates the first figure

fig1 = figure('Name', 'X(t) versus T');

%Gets the initial Position and borders

position = get(fig1,'Position');

outerpos = get(fig1,'OuterPosition');

borders = outerpos -position;

%Plots the first plot and creates more plots and figures

plot(t,x);

xlabel('Time (s)'); ylabel('X(t)'); title('X(t) versus T');

fig2 = figure('Name', 'H(t) versus T');

plot(t,h);

xlabel('Time (s)');ylabel('H(t)'); title('H(t) versus T');

fig3 = figure('Name', 'H(t) versus X(t)');

plot(x,h);

xlabel('X(t)');ylabel('H(t)'); title('H(t) versus X(t)');

%Initialize the edges and positions according to dimensions already retrieved.

edge = -borders(1)/3;

pos1 = [edge,scrsz(4)\*(1/2), scrsz(3)/2 - edge, scrsz(4)/2];

pos2 = [scrsz(3)/2+edge, pos1(2),pos1(3),pos1(4)];

pos3 = [scrsz(3)/4, pos1(2)/3, pos1(3),pos1(4)\*2/3];

%Sets the position of each figure after plotting.

set(fig1,'OuterPosition',pos1)

set(fig2,'OuterPosition',pos2)

set(fig3,'OuterPosition',pos3)

%% Problem #2

% Create two arrays a&b containing integers from 1 to 20

% Find the integer numbers where pythagoreans thereom is satisfied.

clc; close all; clear all;

%Initialize Variables

a = [1:20];a2 = a.^2;

b = [1:20];b2 = b.^2;

num = 1;

count = 0;

for ai = 1:20

for bj = 1:20

c(num) = sqrt(a2(ai)+b2(bj));

if c(num)==fix(c(num))

count = count+1;

intabc(1,count) = a(ai);

intabc(2,count) = b(bj);

intabc(3,count) = c(num);

end

num = num +1;

end

end

num = num - 1;

msgout = ('Output table for a^2 + b^2 = c^2');

disp(msgout);

intabc