Matlab Assignment

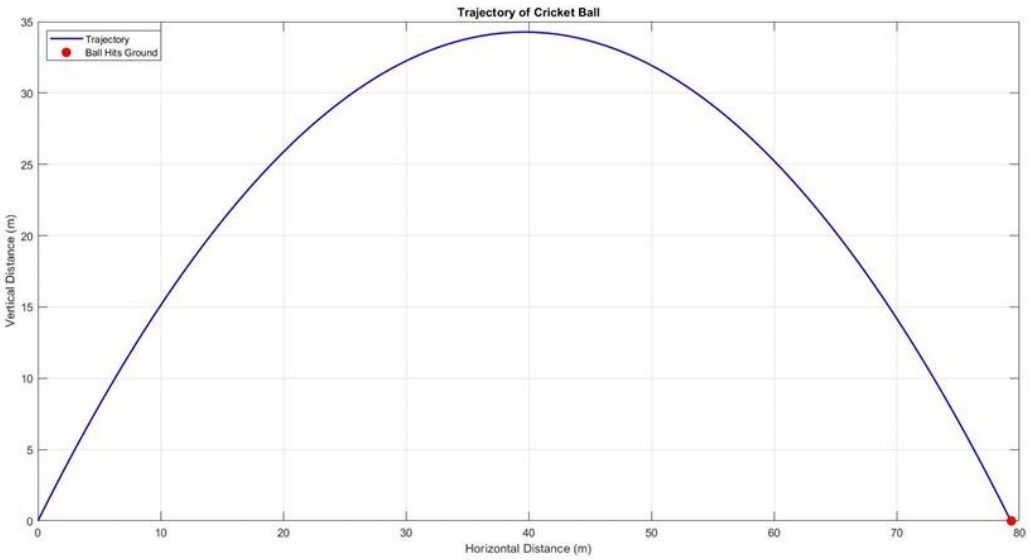
- **Calculation of distance of a cricket ball hit for a six (By Using Matlab)**

Matlab Code:-

```
% Constants
g = 9.81; % Acceleration due to gravity (m/s^2)
% Initial conditions
v0 = 30; % Initial velocity (m/s)
launch_angle = deg2rad(60); % Launch angle in radians
delta_t = 0.01; % Time step (s)
% Initialize arrays
t = 0:delta_t:10; % Time array
x = zeros(size(t)); % Horizontal position
y = zeros(size(t)); % Vertical position
vx = zeros(size(t)); % Horizontal velocity
vy = zeros(size(t)); % Vertical velocity
% Initial conditions
x(1) = 0;
y(1) = 0;
vx(1) = v0 * cos(launch_angle);
vy(1) = v0 * sin(launch_angle);
% Simulation using Finite Difference Method
for i = 2:length(t)
% Update velocities
vx(i) = vx(i-1);
vy(i) = vy(i-1) - g * delta_t;
% Update positions
x(i) = x(i-1) + vx(i) * delta_t;
y(i) = max(0, y(i-1) + vy(i) * delta_t); % Ensure the ball doesn't go below
ground level
% If the ball hits the ground, break the loop
if y(i) == 0
break;
end
end
% Calculate distance and velocity when the ball hits the ground
distance_traveled = x(i);
horizontal_velocity = vx(i);
% Plot trajectory
plot(x(1:i), y(1:i), 'b-', 'LineWidth', 1.5);
hold on;
plot(x(i), y(i), 'ro', 'MarkerSize', 8, 'MarkerFaceColor', 'r');
xlabel('Horizontal Distance (m)');
ylabel('Vertical Distance (m)');
title('Trajectory of Cricket Ball');
```

```
grid on;
legend('Trajectory', 'Ball Hits Ground', 'Location', 'northwest');
% Display results
fprintf('Distance Traveled: %.2f meters\n', distance_traveled);
fprintf('Horizontal Velocity at Ground: %.2f m/s\n', horizontal_velocity);
```

Results




```
>> CricP
Distance Traveled: 79.35 meters
Horizontal Velocity at Ground: 15.00 m/s
```