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Name _____

ENGR 116, Computer Assignment #2

Modify your MatLab program from Computer Assignment #1 to calculate projectile motion in two-dimensions for the following initial conditions:

1) $x_0 = 0$ m, $y_0 = 0$ m, $v_0 = 60$ m/sec, $\theta = 30°$
2) $x_0 = 0$ m, $y_0 = 0$ m, $v_0 = 60$ m/sec, $\theta = 45°$
3) $x_0 = 0$ m, $y_0 = 0$ m, $v_0 = 60$ m/sec, $\theta = 60°$

Turn in plots of:

y vs. t
x vs. t
y vs. x

Turn in <u>one</u> copy of the source code, each of the 3 plots for each set of initial conditions, and below write a short summary of the results comparing how far each projectile went (i.e., compare the ranger of each of the projectiles). Therefore, turn in this cover page with a summary, 1 copy of the source code and 9 plots, arranged in that order (a total of 11 pages – or you can use fewer pages by arranging more than one plot on a page using the "subplot" command – type "help subplot" for more info).

Hint: Write your x and y velocity components in terms of the projectile angle, θ:

```
theta = 30
v0    = 60
v0x   = v0*cos(theta*pi/180)
v0y   = v0*sin(theta*pi/180)
```

Then write your x and y position components in terms of v0x, ax, v0y, and ay:

```
x = x0 + v0x*t + (1/2)*ax*t.^2;
y = y0 + v0y*t + (1/2)*ay*t.^2;
```

```
where ax=0 and ay=-9.81.
Then generate the required plots:
```

```
plot(t,y)
plot(t,x)
plot(x,y)
```

Note: For each of the initial conditions, you will need to set your time interval value tf in order to see each trajectory go until y=0 (by examining the y vs. t plot, and changing tf until the final value of y is fairly close to 0). Also note that all plots must contain a title, and the axes must be labeled, including proper units.

<u>SUMMARY (in the space below, compare the heights and ranges at the different angles):</u>