MATLAB Marina: Introduction to MATLAB

Exercises

1. From the MATLAB Command Window, execute the MATLAB statements in Figure 1 paying attention to the changes in the MATLAB Workspace and Command History windows as each statement is entered and executed.

```
clear;
clc;
x0 = 0.0;
x = 5280.0;
v = 0.0;
a = -32.14;
v0 = sqrt(v^2 - 2*a*(x-x0));
fprintf('Velocity v0 = %0.2f ft/s\n', v0);
```

Figure 1. MATLAB Statements for Exercise 1

2. Using MATLAB's help, determine the proper use the following MATLAB built in functions for cosine (`cos`), sine (`sin`), inverse tangent (`atan`) and square root (`sqrt`).

3. Using MATLAB's editor, write a MATLAB program that determines the horizontal and vertical components of a force that has magnitude F = 10N and direction $\theta = 60°$ from the x axis. Execute (run) the program both by entering the script name in the Command Window and directly from the MATLAB editor using the Run icon in the Editor Tab. Verify that the program correctly computes the horizontal and vertical components of the force. Hint: the horizontal and vertical components of a force F can be determined using the formulas:
    $F_x = F\cos(\theta)$ and $F_y = F\sin(\theta)$.

4. Write a MATLAB program that will convert a set of two-dimensional rectangular coordinates (x, y) to polar coordinates (r, θ). The rectangular coordinates should be read from the user using MATLAB's `input` function and the polar coordinates should be displayed in the Command Window using the MATLAB `fprintf` function. Execute (run) the program and verify its operation for the following sets of inputs: $(x_1, y_1) = (1, 0)$, $(x_2, y_2) = (0, 1)$, and $(x_3, y_3) = (1, 1)$. Why are these inputs a good initial set of test cases? To fully test the program operation and verify its correct operation, what other sets of rectangular coordinates should be used as inputs? Hints: the magnitude and angle of the polar coordinates can be determined from the rectangular coordinates using the formulas: $r = \sqrt{x^2 + y^2}$ and $\theta = \tan^{-1}(\frac{y}{x})$.

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