Recitation Assignment #4

Please do the following problems during your recitation session, including any additional problems given to you by your TA. Within 72hrs of your recitation session, you must upload the complete solutions to these problems to Sakai, so that your TAs can evaluate them in a timely fashion. **Please submit any .m files to Sakai. Your .m files should be named in the following format: NETIDRecitation3Problem#, where NETID is your NetID, and # is the problem number. For instance if your NetID was aaa111, and you were answering problem 3, your .m file would be named aaa111Recitation4Problem3.m. All of your .m files should be in the form of a function. If you do not meet these naming requirements, and do not save as a function, you will not receive credit for your submission.** Collaborative problems can be worked on in teams of up to 5 people, as long as each team member individually completes the problem uploads the solution as part of their own Sakai submission or shows the solution to their instructor individually, and lists the names of all collaborators in the Sakai submission. Collaboration and discussion of solutions is not permitted for questions labeled as individual problems.

1. [Collaboration] Please download Hal9000.m, and make sure to save it to your default MATLAB folder (usually Documents/MATLAB). Hal9000 has written a pretty sweet MATLAB function! This function is supposed to take the oxygen levels on Discovery 1 as its first input and the rotation speed of the centrifugal artificial gravity environment as its second input. The function is then supposed to calculate the difference between the oxygen levels onboard and earth oxygen levels at sea level, and the difference between artificial gravity and earth gravity acceleration, and return those differences (earth – ship). Finally, the function is supposed to inform the crew of the status of the ship, telling them that "Oxygen conditions are nominal." if atmospheric differences between earth and Discovery 1 are minimal, "Warning, low oxygen!" if oxygen levels are too low for life, "Warning, fire hazard!" if oxygen levels are too high. This string should be the third output. In terms of gravity, he should display "Gravity is within norms." if gravity is close to earth's, "Warning, normal functions may be difficult!" if gravity is too high, and "Warning, beware of floating objects!" if gravity is too low. This string should be the fourth output. Unfortunately, as Hal9000 is only artificially intelligent, he forgot to put any white space, tabs, or comments in his function, did not name his variables in an informative way, and put "I'm sorry, I can't do that" for every string in his function. Download Hal's program and do the following:

    a. Include white space and tabs in places to make the program readable.
    b. Add comments to the function to describe what each part is doing. You don't need to add comments to every line, but it should be clear what every line does through commenting and variable names.
    c. Change variable names to augment comments and make the code even more readable.
    d. Fix the strings for the output messages.

2. [Individual] Write a function that calls your corrected program from Problem 1. The inputs to this function will be the same as the previous, oxygen levels and rotation speed. This program should read the warning message from the third and fourth output, and should return four Boolean outputs: the first for the oxygen feed, the second for the fire suppression system, the third for the rotation motor, and the fourth for the emergency wheel brake. It should do the following:

    a. If oxygen is normal, set fire suppression to 0 and oxygen to 1.
    b. If oxygen is high, set fire suppression to 1 and oxygen to 0.

c. If oxygen is low, divert power from the wheel by setting rotation to 0, set oxygen to 1 and set fire suppression to 0.
d. If gravity is normal, and oxygen is not low, set wheel rotation to 1 and emergency brake to 0.
e. If gravity is high, set wheel rotation to 0 and emergency brake to 1.
f. If gravity is low and oxygen is not low, set wheel rotation to 1 and emergency brake to 0.

Please see the “strcmp” function in MATLAB help for a way to compare strings.