

SE370: Computer Aided Systems Engineering

Problem Set 1: Ammo Tracker (100 points)

DOCUMENTATION. This deliverable is an individual assignment. Any assistance received must be documented in detail. Document all sources in accordance with the Office of the Dean Pamphlet “Documentation and Acknowledgement of Academic Work,” (June 2024) and course guidance. Documentation must be turned in at the time of submission. The deliverable is considered late until all portions of the assignment and the documentation are submitted.

1. **Turn In Requirement:**

Submit all of your work in a single Excel file using the following naming convention:

“lastname_X1_SE370_PS1.xlsx” (replace red with your name and section).

Submit your cover sheet and works cited in a single PDF file using the following naming convention:

“lastname_X1_SE370_PS1_refs.pdf” (replace red with your name and section).

2. **Documentation of Assistance:**

- a. Any assistance from anyone other than an SE370 instructor must be documented. Documentation must be specific and detail the topics discussed and actions taken. Vague documentation will result in a higher point deduction.
- b. Assistance is defined as “help one received in completion of academic work except for basic proofreading tools (e.g., Microsoft Word spell checker) or providing information that is considered common knowledge.” Assistance includes, but is not limited to:
 - i. Discussing one’s ideas with others and receiving feedback or ideas that then change or clarify these ideas.
 - ii. Receiving a verbal answer from another person or artificial intelligence (AI) source about a specific point of confusion
 - iii. Having another person or AI source help a student identify errors in their own solution.
 - iv. Having another person or AI source tell a student how to fix the errors in their own solution.
- c. When acknowledging assistance from artificial intelligence sources, use the citation format provided in the DAAW. Your citation must include the prompt you gave to the AI (e.g., ChatGPT) and describe how you used the information received to change your solution.

ChatGPT. Assistance given to the author, AI. I used the following prompt in ChatGPT: “Identify five external entities for a HMMWV to display on a systems context diagram.” ChatGPT identified the driver, maintenance personnel, weapon system, C2 system, and supply chain with detailed descriptions about each. OpenAI, (<https://chatgpt.com>). West Point, NY, 23AUG2024.

- d. Collaboration is not authorized. Collaboration is defined as “two or more people to jointly produce a solution.”
 - e. Sharing of files related to the assignment via electronic means **is not authorized and will result in a zero for all parties** (i.e., those who sent and received). Sharing your work digitally creates unnecessary risk for you and others.
3. **Certification Statement:** Every deliverable submitted for SE370 MUST include a certification cover sheet using the updated guidance from the DAAW.

Problem Set Instructions

Background

Your Battalion is conducting range operations for A Company and B Company. The Battalion S4 has not been able to provide accurate tracking of Ammunition types and expenditures. The Battalion S3 has put you in charge of tracking the BN's Ammo issue, expenditure, and turn-in for Company training tables.

Fix the S4's tracker so that it accurately accounts for ammo expenditures that have been recorded. The provided worksheet contains information on what the BN has drawn from the depot. Expended ammo figures are reported to the BN after ammo turn-in by comparing the amount of ammo issued to the amount turned in. The BN will finish up all ranges in a week, and this tracker will be used in the BN Tactical Operation Center (TOC) for accurate tracking of Company ranges as they complete them. As a result, your spreadsheet needs to be easy to update.

Steps

1. Download SE370-AT25-2-Problem-Set-1.xlsx from Problem Set 1 in Canvas
2. [5 Points] Rename all sheets (except INTRODUCTION) to begin with your "last name_" appended to the beginning of the title of each worksheet.
3. [5 Points] Reformat all dates on the "Hand Receipt Tracker" to YYYYMMDD custom date format.
4. [5 Points] Data has been recorded on the "Hand Receipt Tracker" worksheet, but we need to add formulas to calculate the "Expended" and "% FIRED" columns.
 - a. Input a formula that sets the "Expended" column to the difference between the "Rounds Issued" and "Turned In" columns.
 - b. The "% FIRED" column should be calculated by dividing "Expended" by "Rounds Issued." This column should be formatted as a percentage with two decimal places.
5. [5 Points] Using an Excel function, ensure that the "% FIRED" value does not show "#DIV/0!" and instead shows "-" when encountering a division error.
6. [5 Points] Apply conditional formatting to the "% FIRED" column on the Hand Receipt Tracker worksheet using the 3-flag Icon Set. Leave default values for the flag colors (red under 33, yellow under 67, otherwise green).
7. [10 Points] Currently, anyone can enter any free text in the "Range" column on the Hand Receipt Tracker. Enforce data integrity by building a drop-down list menu for this column so the user can only input a valid range name.
 - a. Possible values for "Range" should be one of: Idaho, Nebraska, Colorado, Utah, Wyoming, or Oklahoma.
 - b. Ensure there is an in-cell dropdown.

- c. Data should be in alphabetical order A-Z on the dropdown list.
 - d. Create a custom error alert that activates after invalid data is entered in the "Range" Column that creates a popup window stating, "Not a valid range" and does not allow the user to force the invalid content into the table.
8. [10 Points] In addition to the range name, you want to store a range ID in the table on the Hand Receipt Tracker. Using the below ID mapping, create a lookup function that automatically populates a "Range ID" column that comes right after the range name after a user selects a range name.

Range Data	
Name	ID
Colorado	1959584
Idaho	2239495
Montana	4419283
Nebraska	2223945
Oklahoma	5596820
Utah	2388830
Wyoming	1238885

- a. Format the "Range ID" column as text.
 - b. Using an Excel function, ensure the column has a blank value instead of showing NA if a range is not selected.
9. [5 Points] Reduce the number of columns devoted to information about the hand receipt holder.
- a. Using a formula, create a column named "HRH" to the right of "First Name" that includes the first letter of the "First Name," all characters from the "Last Name," and the last four numbers of the "ID" column to create a unique identification code for the Company Hand Receipt Holder.
 - b. Hide the "First Name," "Last Name," and "ID" columns.
10. [5 Points] Modify the "% Expended" column on the "BN_Rollup" worksheet using an Excel function to show no value when the formula is trying to divide by 0.
11. [10 Points] On the "BN Rollup" worksheet, the BN CDR is interested in seeing the expenditure by Company of each of the DODIC Ammo types the BN has drawn.
- a. Write Excel functions in the "A Co Issued" and "A Co Turn-in" columns that use the SUMIFS function to sum the amount of ammo issued/turned in for each DODIC type to the Company as shown on the "Hand_Receipt_Tracker" worksheet.
 - b. Do the same thing for B Company.
 - c. Calculate the "A Co Expended" column by subtracting "A Co Issued" from "A Co Turn-in."
 - d. Do the same for B Company.

12. [5 Points] The “Issued to BN” column currently contains an estimate of the total amount of ammo that will be issued in total. Using an Excel formula, modify this cell so that it updates based on the data from the “Hand_Receipt_Tracker.”
13. [5 points] Conditionally format the “BN % Expended” column using a 3-color scale ranging from red, yellow, to green (where green is maximum and red is minimum).
14. [20 Points] Insert a separate Pivot chart/table combination for A Company and B Company showing the results of your analysis as described below.
- Create both pivot tables/charts in the worksheet “BN_Rollup.” Place the A Company table/chart below the label on the right of the table and do the same for B Company.
 - Create a **horizontal barchart** (i.e., the x-axis contains the numeric values while the y-axis contains your categories) that shows the ammo turn-in, expenditure, and issuance by DODIC. Make sure you are displaying data for the relevant Company only.
 - Only display DODICs on the chart that have some values of either turn-in, expenditure, or issuance.
 - Create an overall chart title, x-axis title, and y-axis title for both charts.
 - Change the color palette to something other than the default.
15. [5 points] Remember that this spreadsheet needs to be built to accept new data as the ranges are shut down. Ensure that both the “BN_Rollup” and “Hand_Receipt_Tracker” are built so that everything updates when a user adds new input (rows). Test this for yourself!

<https://support.microsoft.com/en-us/office/how-to-correct-a-div-0-error-3a5a18a9-8d80-4ebb-a908-39e759a009a5#:~:text=The%20simplest%20way%20to%20suppress%20the%20%23DIV%2F0%21%20error,the%20%23DIV%2F0%21%20error%20value%2C%20otherwise%20calculate%20the%20formula.>

<https://support.microsoft.com/en-us/office/create-a-drop-down-list-7693307a-59ef-400a-b769-c5402dce407b>

<https://www.learnexcelnow.com/excel-left-and-right-functions/>

in excel how to create a function that checks if one condition is true from a table then match it with data from the same table

=IFERROR(INDEX(C2:C6, MATCH("Bob", B2:B6, 0)), "Not Found")