Homework 1 Description
CmpE 362 Spring 2017

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Due: 1 March, 23:59, sharp
10. Let $x$ be a vector of real numbers ($-100:100$)

\[ y_1 = \sin x, \quad y_2 = \sin 50x, \quad y_3 = 50 \sin x, \quad y_4 = \sin(x+50), \quad y_5 = 50 \sin 50x, \quad y_7 = x \sin x, \quad y_8 = \sin x/x \]

“Use 4x2 subplot to fit all subfigures belong to a single figure” (Hint: write help for SUBPLOT in MATLAB)

11. Let $x$ be a vector of real numbers ($-20:20$)

Plot $y_1 = \sin x, \quad y_2 = \sin 50x, \quad y_3 = 50 \sin x, \quad y_4 = \sin(x+50), \quad y_5 = 50 \sin 50x, \quad y_7 = x \sin x, \quad y_8 = \sin x/x, \quad y_9 = y_1 + y_2 + y_3 + y_4 + y_5 + y_6 + y_7 + y_8$

“Use 5x2 subplot to fit all subfigures belong to a single figure”

12. \texttt{randn} generates zero-mean, unit variance Gaussian distributed random number in $(-\infty, \infty)$.
Generate 41 random numbers following Gaussian distributed random numbers, call this as vector $z$.

\[ y_{10} = z, \quad y_{11} = z + x, \quad y_{12} = z + \sin x, \quad y_{13} = z \sin x, \quad y_{14} = x \sin z, \quad y_{15} = \sin(x+z), \quad y_{16} = z \sin 50x, \quad y_{17} = \sin(x+50z) \]
\[ y_{18} = \sin x/z, \quad y_{19} = y_{11} + y_{12} + y_{13} + y_{14} + y_{15} + y_{16} + y_{17} + y_{18} \]

“Use 5x2 subplot to fit all subfigures belong to a single figure”

13. \texttt{rand} generates uniformly distributed random number in $[0,1]$. Generate 41 random numbers following uniformly distributed random numbers.

Plot $y_{20} = z, \quad y_{21} = z + x, \quad y_{22} = z + \sin x, \quad y_{23} = z \sin x, \quad y_{24} = x \sin z, \quad y_{25} = \sin(x+z), \quad y_{26} = z \sin 50x, \quad y_{27} = \sin(x+50z) \]
\[ y_{28} = \sin x/z, \quad y_{29} = y_{21} + y_{22} + y_{23} + y_{24} + y_{25} + y_{26} + y_{27} + y_{28} \]

“Use 5x2 subplot to fit all subfigures belong to a single figure”

14. Starting with $z$ (0,1) Gaussian (Normal) Random variable. (Use help menu for “hist”)
   a. Generate 10000 random variables with mean 0, variance 1; call it $r_1$ vector
   b. Generate 10000 random variables with mean 0, variance 4; call it $r_2$ vector
   c. Generate 10000 random variables with mean 0, variance 16; call it $r_3$ vector
   d. Generate 10000 random variables with mean 0, variance 256; call it $r_4$ vector

Plot \texttt{hist}(r1), \texttt{hist}(r2), \texttt{hist}(r3), \texttt{hist}(r4) on the same figure for comparison purposes

15. Starting with $z$ (0,1) Gaussian Random variable. (Use help menu for “hist”)
   a. Generate 10000 random variables with mean 10, variance 1; call it $r_6$ vector
   b. Generate 10000 random variables with mean 20, variance 4; call it $r_7$ vector
   c. Generate 10000 random variables with mean -10, variance 1; call it $r_8$ vector
   d. Generate 10000 random variables with mean -20, variance 4; call it $r_9$ vector

Plot \texttt{hist}(r6), \texttt{hist}(r7), \texttt{hist}(r8), \texttt{hist}(r9) on the same figure for comparison purposes
16. Starting with z (0,1) uniformly distributed random variable.
   a. Generate 10000 random variables with mean 0, variance 1; call it $r_{11}$ vector
   b. Generate 10000 random variables with mean 0, variance 4; call it $r_{21}$ vector
   c. Generate 10000 random variables with mean 0, variance 16; call it $r_{31}$ vector
   d. Generate 10000 random variables with mean 0, variance 256; call it $r_{41}$ vector
   Plot hist($r_{11}$), hist($r_{21}$), hist($r_{31}$), hist($r_{41}$) on the same figure for comparison purposes

17. Starting with z (0,1) uniformly distributed random variable. (Use help menu for “hist”)
   a. Generate 10000 random variables with mean 10, variance 1; call it $r_{61}$ vector
   b. Generate 10000 random variables with mean 20, variance 4; call it $r_{71}$ vector
   c. Generate 10000 random variables with mean -10, variance 1; call it $r_{81}$ vector
   d. Generate 10000 random variables with mean -20, variance 4; call it $r_{91}$ vector
   Plot hist($r_{61}$), hist($r_{71}$), hist($r_{81}$), hist($r_{91}$) on the same figure for comparison purposes

18. Briefly describe what you have learnt from the above plots (plots from Questions 10-17).

19. Briefly describe what you have learnt about MATLAB. What were the challenges that you faced?
    What are the differences (advantages and disadvantages) between MATLAB and the other programming languages you have learned so far?

**Submission and Grading**

Prepare a report includes your code, explanations and comments of your code for each question. Figures would be in the report also. Add the answer to the 18th and 19th questions to your report.

Compress the report and code files. Name it as ”YourNumber CmpE362 HW1.zip” (or rar, or 7z etc.). Send the file to yektasaid.can@gmail.com before the deadline. Subject of the mail would be CmpE362 HW1.

**Notes**

Deadline is strict. Do not send after deadline. When copying is detected, both parties will get zero.