115-1 MATLAB Midterm Exam

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Please upload **all the four m-files**, including **midterm_1.m**, **midterm_2.m**, **midterm_3.m**, and **midterm_4.m**, to the **2026.11.05 Midterm** folder in the E3 system. Please have a copy of all files and bring them to the classroom next week for correction.

Please change the current folder to the **MImaterials_midterm** directory!

1. Program Debug (25 points)

Note: Please open the **midterm_1.m** file in the **MImaterials_midterm** directory and follow the steps below to debug the script.

Steps:

(1) Please identify one error on Line 5 and correct it. (5 points)

(2) Please identify one error on Line 11 and correct it. (5 points)

(3) Please identify errors on Line 12 and correct them. (10 points)

(4) Please identify errors on Lines 21, 25, and 29 and correct them. (5 points)

Once all the errors are corrected, you should be able to see multiplanar images as shown in **Figure 1**.

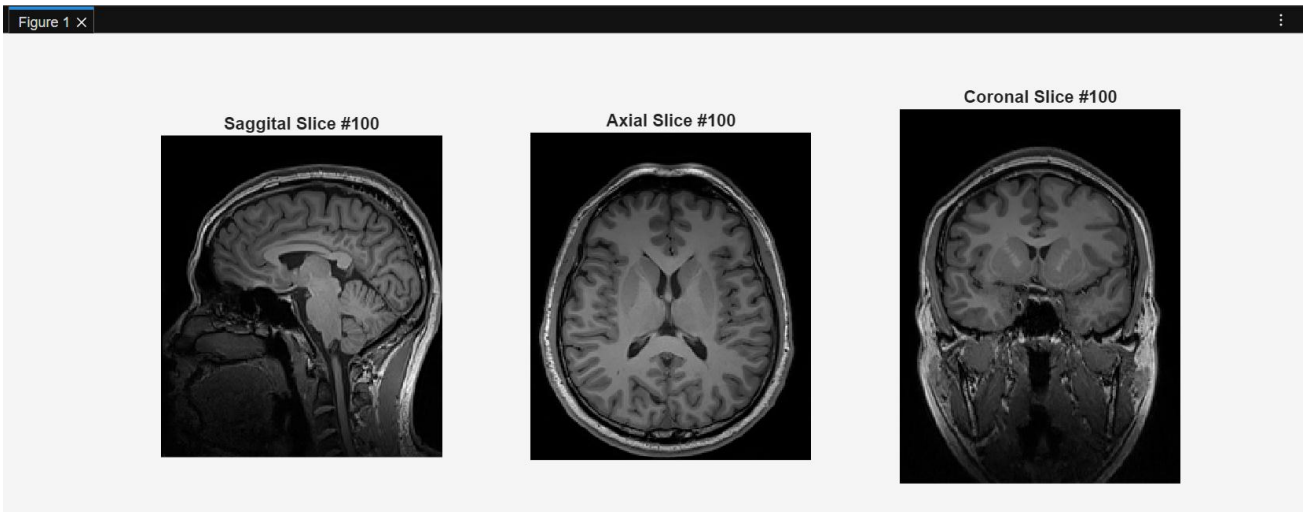


Figure 1

2. Cell Array and Excel File (25 points)

Note: It is critical to ensure that patients' daily caloric intake does not fall below their basal metabolic rate (BMR) to promote favorable outcomes. Please use **readcell** to read patient data from the ***patientlist.xlsx*** file and finish the following steps. Please save the script as **midterm_2.m**.

(1) Please use the following equations to calculate BMR for males and females, respectively. (10 points)

$$\text{BMR for males} = 10 \times \text{body weight (kg)} + 6.25 \times \text{height (cm)} - 5 \times \text{age (years)} + 5$$

$$\text{BMR for females} = 10 \times \text{body weight (kg)} + 6.25 \times \text{height (cm)} - 5 \times \text{age (years)} - 161$$

Hint: Use **cell2mat** to convert a cell array to a numeric array.

(2) Please find out patients with larger BMR values compared to their daily calorie. (5 points)

(3) Please output the results into a new Excel file, ***patientlist_warning.xlsx***, with two new columns, **BMR** and **Warning** (**Figure 2**). Patients with lower BMR values should be labeled with "Warning". (10 points)

	A	B	C	D	E	F	G	H
1	Patients	Age (years)	Gender	Body Weight (kg)	Height (cm)	Daily Calorie	BMR	Warning
2	PT01	47	male	70	171	1420	1538.8	Warning
3	PT02	56	female	61	160	1800	1169	
4	PT03	61	female	77	161	2130	1310.3	
5	PT04	87	female	45	155	1550	822.75	
6	PT05	33	male	80	175	2560	1733.8	
7	PT06	45	male	91	174	3200	1777.5	
8	PT07	21	female	52	165	1540	1285.3	
9	PT08	54	female	44	158	1100	996.5	
10	PT09	57	male	78	182	1800	1637.5	
11	PT10	66	female	64	166	1580	1186.5	
12	PT11	65	female	69	164	1200	1229	Warning
13	PT12	45	male	68	177	2420	1566.3	
14	PT13	44	female	58	170	1640	1261.5	
15	PT14	54	female	52	163	1710	1107.8	
16	PT15	53	male	84	185	1420	1736.3	Warning
17	PT16	29	male	62	174	1680	1567.5	
18	PT17	31	female	47	155	1320	1122.8	
19	PT18	35	male	99	173	3620	1901.3	
20	PT19	47	female	75	158	1840	1341.5	
21	PT20	88	male	69	170	1510	1317.5	
22	PT21	65	female	65	161	2200	1170.3	
23	PT22	61	male	73	178	2150	1542.5	
24	PT23	62	male	71	171	1850	1473.8	
25	PT24	57	female	81	160	1910	1364	
26	PT25	39	female	66	168	2460	1354	
27	PT26	42	male	105	174	1720	1932.5	Warning
28	PT27	44	male	92	180	1960	1830	
29	PT28	65	male	71	179	1460	1508.8	Warning
30	PT29	34	female	52	154	2100	1151.5	
31	PT30	85	female	43	157	1320	825.25	

Figure 2

3. Restore Original Image (20 points)

Note: You are asked to restore the original image from the ***ScrambledImage.jpg*** file (**Figure 3**) based on the provided clues. **Figure 4** shows the four steps used to scramble the original image. You must reverse them to restore it. Please save the script as **midterm_3.m**.



Figure 3

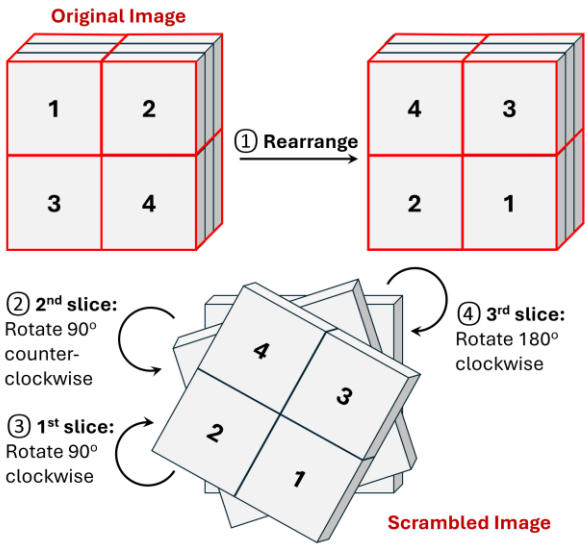
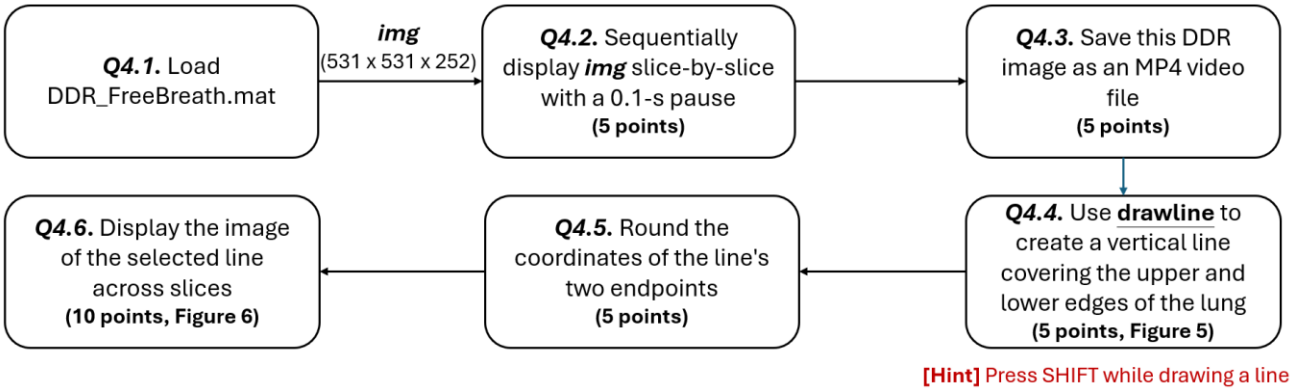


Figure 4

4. Dynamic Digital Radiography (30 points)

Note: Dynamic Digital Radiography (DDR) is a low-dose, high-speed X-ray imaging technology that captures sequential radiographs to observe lungs in motion. Please follow the steps below to accomplish the process and analysis of DDR. Please save the script as **midterm_4.m**.



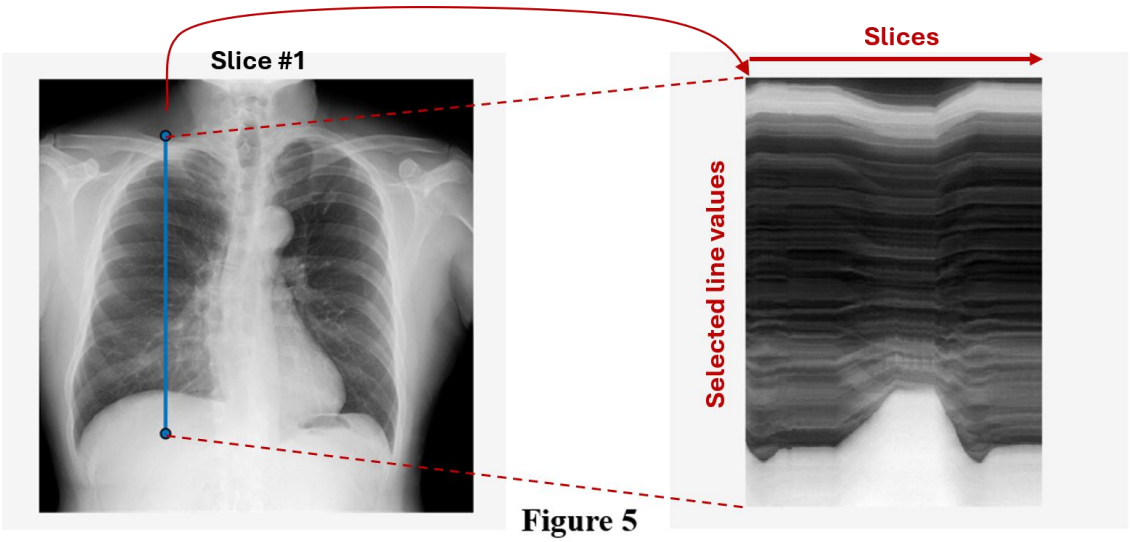


Figure 5

Figure 6