1. 15%   (Answer with the program only)

   Suppose that $\theta = -\frac{\pi}{2}:\frac{\pi}{20}:\frac{\pi}{2}$, and $t = 0{:}0.2{:}4$, $a = 5$, and $b = 2$. Use MATLAB

   code to compute the following expression:

   (a) $\left[e^{-0.2t}\sin(b\theta) + \ln(t+1)\right]\cos^2(2\theta)$

   (b) $\left[\sin^{-1}(at) + \ln(t^2 + 2t + 1)\right]\tan(\theta/2)$

   (c) $\dfrac{e^t + \sin(\theta)}{b}$

2. Table 2.1 shows the costs associated with a certain product, and Table 2.2 shows
   the production volume for the four quarters of the business year. Use MATLAB to
   find:
   (a) the quarterly costs for materials, labor, and transportation
   (b) the total material, labor, and transportation costs for the year
   (c) and the total quarterly costs.
   (The answer should be multiplied by 10^3.)

Unit costs ($\$ \times 10^3$)			
Product	**Materials**	**Labor**	**Transportation**
1	6	2	1
2	2	5	4
3	4	3	2
4	9	7	3

Table2.1 Product cost

Product	**Quarter 1**	**Quarter 2**	**Quarter 3**	**Quarter 4**
1	10	12	13	15
2	8	7	6	4
3	12	10	13	9
4	6	4	11	5

Table2.2 Quarterly production volume

3. 27%

$$A = \begin{bmatrix} 1 & 4 & 2 \\ 2 & 4 & 100 \\ 7 & 9 & 7 \\ 3 & \pi & 42 \end{bmatrix}$$

Use MATLAB to find the following:

a.   Construct a matrix **B** ，it is the transpose of A.

b.   Construct a matrix **D,** deleting **3-nd row of A.**

c.   Construct vector **x,** its elements is the only third row of **B.**

d.   Calculate the sum of all the elements of **x.**

e.   Pointwise multiplication of the 2-nd row of A and 3-th column of B.

4. 15%   Write a MATLAB SUB-function(name it as **func.m**) to evaluate the members of the sequence, where a, and n are the inputs and the sequence value of

$x_n = na^n / (n+1)!$ is the output of this SUB-function and save it as a script file.

Then, write a main function to input the range of the value n from 0 to 20, and a =2, and call the SUB-function to evaluate the sequence value, and display the value of n and x_n by using *fprintf*, as the following format:

n	x_n
0	0
1	1
2	4/3

Hint: By using **rats(X, strlen)** to show the fraction number

5. 20%   A fenced enclosure consists of a rectangle of length L and width $2R$ and a semicircle of radius R, as shown in Figure 4. The enclosure is to be built to have an area A of 2000 ft². The cost of the fence is $50 per foot for the curved portion and $40 per foot for the straight sides.

(a) Use the fminbnd function to determine with a resolution of 0.01 ft the values of R and L required to minimize the total cost of the fence.
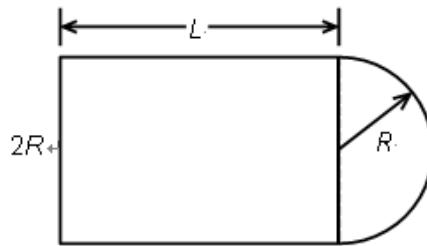
(b) compute **the minimum cost**.

Figure 4