Do all of the assigned homework problems in addition to these

1. Suppose the probability density function, pdf, for the time it takes to learn a task is given by the following density function:

\[ e(x) = 5.5e^{-5.5t} \]

when \( t \geq 0 \), where \( t \) is given in hours. What is the probability that it will take less than 2 hours to learn the task?

2. Suppose that the proportion of patients who recover from mild dehydration \( x \) hours after receiving treatment is given by

\[ f(x) = \begin{cases} 
12x^2 - 12x^3 & \text{when } 0 \leq x \leq 1 \\
0 & \text{when } x < 0 \text{ or } x > 1 
\end{cases} \]

Find the proportion of patients that recover in between 42 minutes and 48 minutes.

3. Suppose \( f(x) = \frac{1}{2}x \) for \( 0 \leq x \leq 2 \) and \( f(x) = 0 \) everywhere else.

   (a) Is \( f(x) \) a density function? Why or why not?

   (b) If the answer to (a) is YES, find the cumulative distribution function \( F(x) \) for the density function \( f(x) \).

4. Match the equations in (a)-(d) with one of the surfaces in Figures 1 through 4.

   (a) \( z = 1 + x^2 + y^2 \).

   (b) \( z = -x^2 - y^2 \).

   (c) \( z = y^2 - x^2 \).

   (d) \( z = \sin y \).
Figure 1: Figure for problem number 4

Figure 2: Figure for problem number 4
Figure 3: Figure for problem number 4

Figure 4: Figure for problem number 4
5. Find surfaces from figures 1 through 4 in the previous problem to go with the 2 contour diagrams given here.

6. Let $f(x, y) = ye^x$.

   (a) Give the formulas for the cross sectional graphs, $f(x, 1)$ and $f(0, y)$.

   (b) Sketch the contour diagram for output values of 1, 2, 3, 4. Label the contour lines.
Figure 6: Figure for problem number 5