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<th>Problem</th>
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1. Suppose you have an urn containing one nickel, three dimes, and one quarter, and you randomly pick two coins out of the urn. Let \( X \) be the value of the two coins. Write down the probability density function and \( E(X) \).

(14 points)

2. If you invest $600 at 9\% annual interest, how much money do you have at the end of 4 years if

(12 points, 3 each)

a) It is simple interest.

b) It is compounded yearly.

c) It is compounded quarterly.

d) It is compounded monthly.

3. What is the effective interest rate of 200\% annual interest compounded a) semi-annually b) weekly.

(8 points, 4 each)
4. If you want to end up with $30,000 in 3 years by making monthly deposits at 3% interest compounded monthly, how much should those monthly payments be?  
(8 points)

5. If you get a loan of $30,000 to be paid off in 4 years by making monthly payments at 5% interest compounded monthly, a) how much are those monthly payments?  b) How much interest will you pay?  
(8 points)

6. If your mother loans you $1000, the interest to be compounded annually, and you pay her back $27,000 in three years. What was the annual interest rate?  
(6 points)

7. Solve by graphing.  
(8 points)

\[
2x + 4y = 2 \\
6x + 3y = -3
\]
8. Solve any way you want.
(12 points, 6 each)
   a) 
   \[3x_1 + 2x_2 = 7\]
   \[5x_1 + 3x_2 = 11\]

   b)
   \[x_1 + x_2 + 3x_3 = 3\]
   \[x_1 + 3x_2 + 3x_3 = 2\]

9. Solve the equations using Gauss–Jordan elimination
(16 points, a)=6 points, b)=10 points)
   a) 
   \[x_1 + 3x_2 = 1\]
   \[3x_1 + 7x_2 = 1\]

   b)
   \[x_1 + 2x_2 + 3x_3 = 3\]
   \[x_1 + 3x_2 + 2x_3 = 1\]
   \[x_1 + 2x_2 + 4x_3 = 4\]