MGF 1106 - Review of probability

Leave your answers to parts A, B, C and D as unreduced fractions.

Determine sample space and probabilities for various experiments.

A. Tossing coins - Three coins are to be tossed.
   1. Use the fundamental counting principle to determine the total number of possible outcomes.
   2. Make a tree diagram and list the sample space.
   3. Determine each of the following probabilities.
      \[
      \begin{align*}
      P(\text{three heads}) = & \\
      P(\text{at least one head}) = & \\
      P(\text{at least two heads}) = & \\
      P(\text{exactly two heads|first toss is heads}) = & \\
      P(\text{at least one heads|first toss is tails}) = & \\
      P(\text{heads then tails then heads}) = & 
      \end{align*}
      \]

B. Filling offices - Larry, Moe and Curly plan to form a club with each member holding one of the following offices: president, vice-president and treasurer.
   1. Use the fundamental counting principle to determine the number of ways the offices can be filled.
   2. Make a tree diagram and list the sample space.
   3. Determine each of the following probabilities:
      \[
      \begin{align*}
      P(\text{Larry is president and Moe is vice-president}) = & \\
      P(\text{Curly is treasurer}) = & \\
      P(\text{Moe is president}) = & \\
      P(\text{Moe is vice-president or Curly is president}) = & \\
      P(\text{Moe is vice-president and Curly is president}) = & 
      \end{align*}
      \]

C. Drawing cards -
   1. One card is to be drawn from a standard card deck.
      \[
      \begin{align*}
      P(\text{Ace of hearts}) = & \\
      P(\text{Ace or King}) = & \\
      P(\text{Black face card}) = & \\
      P(\text{even number}) = & \\
      P(\text{Ace or black card}) = & \\
      P(\text{Ace of spades|the card is black}) = & 
      \end{align*}
      \]
   2. Two cards are to be drawn with replacement.
      \[
      \begin{align*}
      P(\text{Ace and king}) = & \\
      P(\text{Ace and Ace}) = & \\
      P(\text{Ace and not Ace}) = & \\
      P(\text{club and spade}) = & 
      \end{align*}
      \]
   3. Two cards are to be drawn without replacement.
      \[
      \begin{align*}
      P(\text{Ace and king}) = & \\
      P(\text{Ace and Ace}) = & \\
      P(\text{Ace and not Ace}) = & \\
      P(\text{club and spade}) = & 
      \end{align*}
      \]
D. From a chart -
1. Results of a recent survey are as follows:

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>No opinion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Republican</td>
<td>20</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Democrat</td>
<td>25</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Independent</td>
<td>6</td>
<td>5</td>
<td>7</td>
</tr>
</tbody>
</table>

Based on this survey, find the probability of each response.

P(yes) =
P(no) =
P(no|democrat) =
P(no opinion|independent) =
P(yes or no) =

GIVE YOUR ANSWERS TO SECTION E IN DECIMAL FORM.

E. From percents or decimals -
1. A survey indicates that 40% of motorists wear seat belts. Two cars are stopped at a red light.
   P(they both have their seat belt on) =
P(they both have their seat belt off) =
P(at least one is on) = Note: This can be calculated as 1 – P(no seat belt is on)

2. A survey of supermarket shoppers indicates that 45% bought bread, 30% bought milk, 25% bought meat, 12% bought milk and bread, and 8% bought meat and bread.
   P(milk or bread) =
P(meat or bread) =

3. The probability that an earth quake occurs is .02. The probability that a tornado strikes is .04.

   P(earth quake and tornado) =
P(earth quake or tornado) =

4. A rocket scientist examines 100 circuits and finds that 2 are defective. A circuit is to be pulled at random from the shelf.

   P(defective) =
P(not defective) =

   If two circuits are pulled, P(both are defective) =
P(neither are defective) =

ANSWERS IN UNREDUCED FORM:
A. 1. 1/8, 7/8, 4/8, 2/4, 3/4, 1/8
B. 1. 1/6, 2/6, 2/6, 3/6, 1/6
C. 1. 1/52, 8/52, 6/52, 20/52, 28/52, 1/26
   2. 16/2704, 16/2704, 192/2704, 169/2704
   3. 16/2652, 12/2652, 192/2652, 169/2652
D. 1. 51/100, 25/100, 8/38, 7/18, 76/100
E. 1. .16, .36, .64
    2. .63, .62
    3. .0008, .0592
    4. .02, .98, .0004, .9604