1. (20) Suppose \( n(U) = 38, n(A) = 16, n(A \cap B) = 12, \) and \( n(B') = 10. \) What is \( n(A \cup B) \)?

Solution: \( n(A \cup B) = n(A) + n(B) - n(A \cap B), \) keeping in mind \( n(B) = n(U) - n(B') = 28, \) one has \( n(A \cup B) = 32. \)

\( n(A \cup B) = \)
2. (20) How many 10 digit telephone numbers can be generated if the first digit may not be 0 and the last one may not be 9?

Solution: $9^2 \times 10^8$

the number is:
3. (20) One card is drawn from a deck of 52 cards. Find the probability $P$ of drawing a red card or a face card.

Solution: $P(\text{red card}) = \frac{26}{52}$, $P(\text{face card}) = \frac{12}{52}$, $P(\text{red card} \cap \text{face card}) = \frac{6}{52}$, hence

$P(\text{red card} \cup \text{face card}) = \frac{26}{52} + \frac{12}{52} - \frac{6}{52} = \frac{32}{52}$. 
4. (20) Two dice are rolled. Find the odds $O$ of rolling an even number. (An odd of an event $E$ is $\frac{P(E)}{P(E^c)}$.)

Solution:
$P($rolling an even number$) = \frac{1}{2}$, $P($rolling an odd number$) = \frac{1}{2}$. $O = \frac{1}{2} : \frac{1}{2} = 1$. 
$O =$
5. (20) Let $A$ and $B$ be independent events with $P(A) = \frac{1}{3}$, and $P(B) = \frac{1}{4}$. Find $P(A \cap B)$ and $P(B \cup A)$.

**Solution:**

$P(A \cap B) = P(A)P(B) = \frac{1}{12}$.  
$P(A \cup B) = P(A) + P(B) - P(A \cap B) = \frac{5}{12}$.

$P(A \cap B) = \frac{1}{12}$  
$P(A \cup B) = \frac{6}{12}$.  

6. (20) (extra credit)

The following table gives outcomes of forecast and weather:

<table>
<thead>
<tr>
<th></th>
<th>rain (R)</th>
<th>no rain (NR)</th>
<th>sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forecast of rain (FR)</td>
<td>66</td>
<td>156</td>
<td>222</td>
</tr>
<tr>
<td>Forecast of no rain (FNR)</td>
<td>14</td>
<td>764</td>
<td>778</td>
</tr>
<tr>
<td>Sum</td>
<td>80</td>
<td>920</td>
<td>1000</td>
</tr>
</tbody>
</table>

Calculate the probability \( P = P(NR|FNR) \) that there was no rain, given that the forecast called for no rain.

Solution: \( P(NR|FNR) = \frac{P(NR \cap FNR)}{P(FNR)} = \frac{764}{778} \approx 92\% \).