MT-A403-01 Exam One Spring 2001

You may keep this list of questions. Turn in all of your work with your answers on the colored paper.

(1) 12 Points. In a small paleontology class, each of the six students must write a report on one of the ten field trips. In how many different ways can they each choose one of the field trips if no two students may choose the same field trip?

(2) 12 Points. A wholesaler has a shipment of 500 burglar alarms which contains 21 defective alarms. If 60 of these alarms are randomly selected and shipped to a customer, find the probability that the customer will receive at least two bad alarms.

(3) 35 Points. The random variable $X$ has the following density function.

<table>
<thead>
<tr>
<th>$X$</th>
<th>3</th>
<th>6</th>
<th>9</th>
<th>12</th>
<th>15</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P(X)$</td>
<td>0.05</td>
<td>0.10</td>
<td>0.40</td>
<td>0.20</td>
<td>0.15</td>
<td>0.10</td>
</tr>
</tbody>
</table>

(a) Compute the expected value of $X$.
(b) Compute the variance of $X$.
(c) Compute the standard deviation for $X$.
(d) Compute the moment coefficient of skewness, $a_3$, for $X$.
(e) Compute $P(X \leq 15 \mid X \geq 9)$

(4) 15 Points. At a checkout counter, customers arrive at an average of 1.2 per minute. Find the probability that at most 24 customers will arrive during an interval of 30 minutes.
(5) 16 Points. Suppose that colored balls are distributed in 3 boxes as follows:

- box 1 contains 3 red balls, 2 white ball and 5 blue balls
- box 2 contains 7 red balls, 3 white balls and 6 blue balls
- box 3 contains 5 red balls, 12 white balls and 3 blue balls

One of the boxes is selected by a procedure for which there is a 50% probability of selecting box 1, a 40% probability of selecting box 2, and a 10% probability of selecting box 3. From the selected box, a ball is selected at random. If the ball is white, what is the probability that it is from box 3?

(6) 10 Points. Write a brief essay explaining the meanings of statistical independence and dependence of events. Include both mathematical definitions and plain language explanations for independence. Give examples relating the mathematical and plain language explanations. Discuss why these are important concepts.