The following exam consists of 14 problems worth a total of 100 points. There are 8 multiple choice questions worth 5 points each. There are 6 work-out problems worth 10 points each.

Partial credit will be awarded on the work-out problems, according to completeness of work. Please remember, full-credit will not be given for work-out problems unless there is sufficient work shown! A number with no work is not enough.

Write the answers to each problem down in the space provided. Scratch work may done on the blank pages provided.

Please answer the questions on the next page, BEFORE beginning the exam.

You may begin the exam when the instructor indicates.
To improve instruction in this course, we are accumulating information about the study preparation and performance of MATH 166 students. Please answer as accurately as possible the questions that follow and those at the end of the exam. Your responses will be confidential. Any reference to this information will be group based, not individual specific. Thank you and good luck on the exam.

BEFORE beginning the exam, please answer the questions below:

MATH 166 EXAM 3 SPRING 1999

Student ID: ______________________

1. APPROXIMATELY how many hours did you spend studying for this MATH 166 exam? ________ hours

2. What goal do you have for your score (%) on this test? ________ %

3. How many sample exams did you use to practice for this exam. Include any online exams and exams from similar classes _______

4. Which of the resources listed below have you used this semester? Please check all that apply:
   - _______ Attended the on-campus evening Exam Review
   - _______ Attended the on-campus evening Weekly Reviews
   - _______ Attended the on-campus Help Session
   - _______ Used a private tutor
   - _______ Used an off-campus tutoring service (such as 4.0 & Go)
   - _______ Used my instructor’s office hours
   - _______ Took the online practice test

COMPLETE THE QUESTIONS BELOW WHEN YOU HAVE FINISHED THE EXAM

5. What total score (%) do you think you received on this test? ________ %

6. How satisfied would you be with that score?
Use the scale of 1 to 6 with 1 = not at all satisfied to 6 = very satisfied ________

7. If you took the online practice test, how well do you think it prepared you for this exam?
Use the scale of 1 to 6 with 1 = not at all satisfied to 6 = very satisfied ________
1. Assume the probability of a boy being born is the same as a girl. The probability that in a family of 5 children, three or more children will be girls is given by

A) \(C(5, 3)\)  \hspace{1cm} B) \(C(5, 3)(.5)^5\)  \hspace{1cm} C) \(\frac{C(5, 3) + C(5, 4) + C(5, 5)}{32}\)  \hspace{1cm} D) \(\frac{C(5, 3) + C(5, 4) + C(5, 5)}{5}\)  \hspace{1cm} E) none of these

2. A raffle is being given by a local church. There will be one first prize awarded, two second prizes (of $75.00), 5 third prizes (of $50.00), and 10 fourth prizes (of $25.00). 1000 tickets will be sold for 1 dollar each. How much must the first prize be in order for the raffle to be fair?

A) 100  \hspace{1cm} B) 200  \hspace{1cm} C) 150  \hspace{1cm} D) 350  \hspace{1cm} E) none of these

3. A buyer for a local department store is considering buying a batch of clothing for $50,000.00 She estimates that the store will be able to sell the clothing for $70,000.00 with probability 0.30, $65,000.00 with probability 0.50 and $60,000.00 with probability 0.20. If she gets a 10% commission (based on profit) on the sales of the clothing, she can expect to receive

A) 1,050.00  \hspace{1cm} B) 1,550.00  \hspace{1cm} C) 750.00  \hspace{1cm} D) 6,550.00  \hspace{1cm} E) none of these

4. Given \(P(A) = 0.2, P(B) = 0.5\) and \(P(A \cup B) = 0.6\) which of the following is correct

A) A and B are independent  \hspace{1cm} B) A and B are mutually exclusive  \hspace{1cm} C) A and B are dependent  \hspace{1cm} D) A and B are complementary  \hspace{1cm} E) none of these

5. If \(P(A|B) = P(B|A)\) and \(P(A \cap B) \neq 0\) then \(P(A) = P(B)\)

(A) True  \hspace{1cm} (B) False

6. A random variable \(X\) has mean \(\mu = 10.0\) and standard deviation \(\sigma = 1.5\). The probability that \(P(8 \leq X \leq 12)\) is greater than

A) \(\frac{4}{3}\)  \hspace{1cm} B) \(\frac{7}{16}\)  \hspace{1cm} C) \(\frac{9}{16}\)  \hspace{1cm} D) \(\frac{2}{3}\)  \hspace{1cm} E) none of these

7. A Bernoulli distribution with 100 objects, and a probability of success equal to 0.2 can be replaced with a normal distribution with

A) \(\mu = 20, \sigma = 16\)  \hspace{1cm} B) \(\mu = 16, \sigma = 20\)  \hspace{1cm} C) \(\mu = 20, \sigma = 4\)  \hspace{1cm} D) \(\mu = 80, \sigma = 4\)  \hspace{1cm} E) none of these

8. Suppose \(X\) is a normally distributed random variable, with \(\mu = 10\) and \(\sigma = 2\). Let \(Z\) be a random variable with a standard normal distribution, then \(P(8 < X < 11)\) is the same as

A) \(P(-1 < Z < 0.5)\)  \hspace{1cm} B) \(P(-1 < Z < 1)\)  \hspace{1cm} C) \(P(0.5 < Z < 1.0)\)  \hspace{1cm} D) \(P(-2 < Z < 1.0)\)  \hspace{1cm} E) none of these
9. If 1% of the eggs in a large shipment are broken, what is the probability that a customer checks 3 cartons before finding a fourth carton with no broken eggs.

10. From solving the birthday problem in class, we know that the probability of 2 or more people having the same birthday in a group of 25 people is approximately 0.569.

   Find the probability that exactly two people have the same birthday, in a group of 25 people. (Assume 365 days in a year)
11. Given the following table

<table>
<thead>
<tr>
<th>Drivers</th>
<th>% Drivers in Group</th>
<th>% Stopped for Moving Violation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I (using seat belts)</td>
<td>64.0%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Group II (not using seat belts)</td>
<td>36.0%</td>
<td>0.5%</td>
</tr>
</tbody>
</table>

If a driver is stopped for a moving violation, what is the probability that
a) He or she will have a seat belt on?

b) He or she will not have a seat belt on?

12. Given the following tree diagram

Find the probability $P(B|D^c)$. 
13. An experiment consists of throwing two standard 6 sided dice on the table, and then taking the product of the numbers thrown. If $X$ is the random variable denoting the product of the die

a) Graph the probability distribution (histogram) associated with $X$.

b) What is $E(X)$

14. An urn contains 5 red balls, 6 white balls, and 4 blue balls. What is the probability that 2 red balls and 2 white balls will be drawn in the first 5 balls.