Math 124 Final Review Continued. Name: [Key]

(1) You must use the Cumulative Binomial Distribution Table for all parts to this question.

(a) Consider a Binomial process with \( n = 9 \) trials and probability of success \( p = 0.4 \), find the probability of getting at most 4 successes.

\[ B(4; 9, 0.4) = 0.7334 \]

(b) Consider a Binomial process with \( n = 9 \) trials and probability of success \( p = 0.4 \), find the probability of getting exactly 4 successes.

\[ b(4) = B(4) - B(3) = 0.7334 - 0.4826 \]

(c) Consider a Binomial process with \( n = 9 \) trials and probability of success \( p = 0.4 \), find the probability of getting 4, 5, 6, or 7 successes.

\[ B(7) - B(3) = 0.9962 - 0.4826 \]

(d) Consider a Binomial process with \( n = 10 \) trials and probability of success \( p = 0.4 \), find the probability of getting at least 4 successes.

\[ 1 - B(3; 10, 0.4) = 1 - 0.3823 \]

(e) Now, consider a Binomial process with \( n = 10 \) trials and probability of success \( p = 0.65 \), find the probability of getting at least 6 successes.

\[ B(4; 10, 0.35) = 0.7515 \]

You must use the Standard Normal Curve Table for questions (2) and (3).

(2) Find the indicated probability given that \( Z \) is a random variable with a standard normal distribution.

(a) \( P(Z \leq -0.31) \)

\[ 0.3783 \]

(b) \( P(0.04 \leq Z \leq 1.34) \)

\[ 0.9099 - 0.5160 \]

(c) \( P(Z \geq -1.1) \)

\[ 1 - 0.1357 \]
(3) Given that \( X \) is a normally distributed random variable with \( \mu = 1 \) and \( \sigma = 0.5 \), find the following probability.

\[
P_r(X \leq 1.24)
\]

\[
\Pr \left( z \leq \frac{1.24 - 1}{0.5} \right) = \Pr \left( z \leq \frac{0.24}{0.5} \right) = \Pr (z \leq 0.48) = 0.6841
\]

(4) An amount of \( P \) dollars is borrowed for the given length of time at an annual interest rate of \( r \). Determine the simple interest that is owed. (Set up with the appropriate formula, but do not evaluate.) \( P = \$1200, r = 3.0\%, 6 \) months.

\[
I = Prt = (1200)(0.03)(0.5)
\]

(5) Suppose that you open up a savings account with an initial balance \( P = \$1000 \) and an annual interest rate of \( r = 1.1\% \). Compute the amount in the account after 5 years when the interest is compounded (Set up with the appropriate formula, but do not evaluate.)

(a) quarterly.

\[
F = 1000 \left(1 + \frac{0.11}{4}\right)^{4 \cdot 5}
\]

(b) monthly.

\[
F = 1000 \left(1 + \frac{0.11}{12}\right)^{12 \cdot 5}
\]

(6) Suppose you knew of an investment that went from \$900 to \$7200 in 24 years. Using the table below, estimate what the approximate annual rate was.

<table>
<thead>
<tr>
<th>Interest Rate</th>
<th>Doubling Time (Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>17.67</td>
</tr>
<tr>
<td>5</td>
<td>14.21</td>
</tr>
<tr>
<td>6</td>
<td>11.90</td>
</tr>
<tr>
<td>7</td>
<td>10.24</td>
</tr>
<tr>
<td>8</td>
<td>9.01</td>
</tr>
<tr>
<td>9 (circled)</td>
<td>8.04</td>
</tr>
<tr>
<td>10</td>
<td>7.27</td>
</tr>
<tr>
<td>15</td>
<td>4.96</td>
</tr>
<tr>
<td>20</td>
<td>3.80</td>
</tr>
</tbody>
</table>

\[900 \rightarrow 1800 \rightarrow 3600 \rightarrow 7200\] (doubles 3 times in 24 years, thus the doubling time is \( 24/3 = 8 \) years.

9% interest