Homework #4 Name: ______________________

If a question is wrong, or has no acceptable answer, do not mark any choice.
If a question has several correct answers, choose the most accurate/complete/informative one.
On a separate sheet, write a detailed justification of your choice.
You will be graded on the accuracy and precision of this justification only.
You will get 1 point for each correct answer and 0 points for missing or incorrect answers.
Your grade will be written on the back of this page.

1. The close form of $\sum_{i=1}^{n}(2i+2)$ is:

   [-A-] n^2+3n-2
   [-B-] $n(n+1)+2n$
   [-C-] n^2+n
   [-D-] None of the above

2. The value of $\displaystyle\sum_{i=45}^{60} i$ is (remember Gauss):

   [-A-] 840
   [-B-] 850
   [-C-] 880
   [-D-] 900

3. How many times does the following program prints "hi" for $n = 9$.

```
for (i=0; i<n; i++) {
  for (j=i+1; j<=n; j++) {
    print("hi");
  }
}
```

   [-A-] 45
   [-B-] 60
   [-C-] 90
   [-D-] none of the above

4. Let L be a language containing exactly l strings.
   Let M be a language containing exactly m strings.
   The number of strings in $L \cup M$ is:

   [-A-] exactly $l+m$
   [-B-] at least $l+m$
   [-C-] at most $l+m$
   [-D-] None of the above

5. Let $L = \{aa, b\}$ and $M = \{bb, a\}$ be languages over $\{a, b\}$.
   Let $X = LML$.

   [-A-] $a^0 \in X$
   [-B-] $a^3 \in X$
   [-C-] $a^5 \in X$
   [-D-] $a^7 \in X$

6. Let A be an alphabet.
Which of the following is **not** a language over A.

[-A-] Λ
[-B-] $\varnothing$
[-C-] A
[-D-] $\{\Lambda\}$

7. Let L be an alphabet.

[-A-] $L^* = L^*L^*$
[-B-] $L^* \subseteq L^*L^*$
[-C-] $L^* \supseteq L^*L^*$
[-D-] None of the above

8. Let $P(n)$ be a statement where n stands for a natural number.
In a proof by induction of P, the base case proves $P(k)$ where k is:

[-A-] zero
[-B-] zero or greater than zero
[-C-] strictly greater than zero
[-D-] None of the above

9. In a proof by induction of $P(n)$, you must prove:

[-A-] $P(k)$, for $k \geq 0$
[-B-] $P(k) \wedge P(k+1)$, for $k > 0$
[-C-] if $P(k)$, then $P(k+1)$, for $k > 0$
[-D-] if $P(k)$, then $P(k+1)$, for $k \geq 0$

10. Let $a_0 = 2$ and, for $n > 0$, $a_n = a_{n-1} + 2$ be a recurrence relation.
The close form of a_n is:

[-A-] $2(n-1)$
[-B-] $2n$
[-C-] $2(n+1)$
[-D-] n^2

11. Let $a_0 = 0$ and, for $n > 0$, $a_n = a_{n-1} + 3$ be a recurrence relation.
The close form of a_n is:

[-A-] $3(n-1)$
[-B-] $3n$
[-C-] $3(n+1)$
[-D-] n^2