

Section A:

Question 2 (26%):

Consider the following C++-like program.

```
int i = 1, A[3] = {3, 2, 0};

void dummy( int x, int y ) {
    int i;
D0:    i = x;
D1:    x = y;
D2:    y = i;
}

main( ) {
    dummy( i, A[i] );
    cout << "i=" << i
          << ", A[0]=" << A[0]
          << ", A[1]=" << A[1]
          << ", A[2]=" << A[2] << endl;
}
```

Assuming static scope rule, what are the output of the following program if the actual parameters of the dummy procedure is passed by *value*, *reference*, *name*, *value-result* and *macro substitution* respectively? In each case, give the value of the global variables i , $A[0]$, $A[1]$ and $A[2]$ and that of the local variable i in `dummy()` right after the execution of statements D0, D1 and D2. List the variable values in a table format as shown in next page.

(a) Call-by-value (4%)

Output:	$i = 1, A[0] = 3, A[1] = 2, A[2] = 0$
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	i	$A[0]$	$A[1]$	$A[2]$	<code>dummy::i</code>
Right after D0	1	3	2	0	1
Right after D1	1	3	2	0	1
Right after D2	1	3	2	0	1

(b) Call-by-reference (4%)

Output:	$i = 2, A[0] = 3, A[1] = 1, A[2] = 0$
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	i	$A[0]$	$A[1]$	$A[2]$	<code>dummy::i</code>
Right after D0	1	3	2	0	1
Right after D1	2	3	2	0	1
Right after D2	2	3	1	0	1

(c) Call-by-name (6%)

Output:	$i = 2, A[0] = 3, A[1] = 2, A[2] = 1$
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	i	$A[0]$	$A[1]$	$A[2]$	<code>dummy::i</code>
Right after D0	1	3	2	0	1
Right after D1	2	3	2	0	1
Right after D2	2	3	2	1	1

(d) Call-by-value-result (6%)

Output:	$i = 2, A[0] = 3, A[1] = 1, A[2] = 0$
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	i	$A[0]$	$A[1]$	$A[2]$	<code>dummy::i</code>
Right after D0	1	3	2	0	1
Right after D1	1	3	2	0	1
Upon completion of <code>dummy()</code>	2	3	1	0	Does not exist

(e) Macro substitution (6%)

Output:	Unpredictable results
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	i	$A[0]$	$A[1]$	$A[2]$	<code>dummy::i</code>
Right after D0	1	3	2	0	Undefined
Right after D1	1	3	2	0	Undefined
Right after D2	1	Unpredictable	Unpredictable	Unpredictable	Undefined

< END of Section A >