

## HAL/S PROGRAMMING FUNDAMENTALS QUIZ 2

1. True or False. The usages of Replace Macros are underlined by the Output Writer of the HAL/S Compiler. If you want to see what was actually compiled you can enclose the macro in  $\$$  signs to see the full expansion. Ans. \_\_\_\_\_
  
2. True or False. A REPLACE Macro follows standard name scope rules. It must appear in the Declare Group and only has effect on source code following its appearance. Ans. \_\_\_\_\_
  
3. True or False. For testing or evaluation purposes you don't always have to separately compile the various Compools, Programs, or Comsubs that your module will use. You can simply insert the full source for these blocks at the beginning of your source code and use the keyword EXTERNAL prior to the keywords COMPOOL, PROGRAM, PROCEDURE and FUNCTION. Ans. \_\_\_\_\_
  
4. True or False. Subscripting in HAL/S starts with the 0<sup>th</sup> element. Ans. \_\_\_\_\_
  
5. True or False. The only data types in HAL/S that may have Component Subscripting are Bit Strings, Character Strings, Vectors and Matrices. Ans. \_\_\_\_\_
  
6. True or False. The Output Writer formats your source code in up to 3 lines indicated as E (exponent), M (main), and S (subscript) lines by the contents of column 1. You may actually input your code using this same 3-line convention. Ans. \_\_\_\_\_
  
7. Which of the following character string subscripts does not require parentheses? A) STRING\$(2I), B) STRING\$(SELECT\_POS), C) STRING\$(I\*\*3 - 1). Ans. \_\_\_\_\_
  
8. True or False. The length of character strings at run time may vary from 0 to 255 characters. Ans. \_\_\_\_\_

9. In the following situations write down the substrings produced by the indicated subscripting:

DECLARE ALPHABET CHARACTER(10) INITIAL('ABCDEFGHIJ');

a) ALPHABET\$1 Ans. \_\_\_\_\_

b) ALPHABET\$(3 AT 3) Ans. \_\_\_\_\_

c) ALPHABET\$(6 TO 9) Ans. \_\_\_\_\_

10. True or False. VECTORs may be defined with lengths ranging from 1 to 64. MATRIX dimensions may have from 1 to 64 rows and columns.

Ans. \_\_\_\_\_

11. Show the results from the following situation:

```
DECLARE VECT1 VECTOR DOUBLE INITIAL(1,2,3);  
DECLARE INTEGER, I INITIAL(1), J INITIAL(2), K INITIAL(3);  
DECLARE INTEGER, IC CONSTANT(1), JC CONSTANT(2), KC  
CONSTANT(3);
```

a) What data type is VECT1\$I Ans. \_\_\_\_\_

b) Will this compile? VECT1\$(I TO J) Ans. \_\_\_\_\_

c) Will this compile? VECT1\$(2 AT J) Ans. \_\_\_\_\_

d) Will this compile? VECT1\$(IC TO JC) Ans. \_\_\_\_\_

e) Will this compile? VECT1\$(JC AT K) Ans. \_\_\_\_\_

12. True or False. The result of subscripting on a MATRIX can be a SCALAR, a VECTOR, or a smaller MATRIX.

Ans. \_\_\_\_\_

13. What are the maximum values?

• The number of characters in a character string: Ans. \_\_\_\_\_

• The maximum length of a vector: Ans. \_\_\_\_\_

• The maximum number of matrix rows and cols: Ans. \_\_\_\_\_

• The maximum number of dimensions in an array: Ans. \_\_\_\_\_

• The maximum size of an array dimension: Ans. \_\_\_\_\_

14. True or False. Array subscripts must always terminate with a colon “:”.

Ans. \_\_\_\_\_

15. True or False. Parentheses are mandatory in the following situation:

VARIABLE\$(3:) Ans. \_\_\_\_\_

16. In the following situation: DECLARE MMAT MATRIX(4,4);

- a) What data type is MATRIX\$(1,3) Ans. \_\_\_\_\_
- b) What data type is MATRIX\$(\*,2) Ans. \_\_\_\_\_
- c) What data type is MATRIX\$(2 AT 2,3 AT 1) Ans. \_\_\_\_\_
- d) What data type is MATRIX\$(3,\*) Ans. \_\_\_\_\_
- e) What data type is MATRIX\$(\*,\*) Ans. \_\_\_\_\_

In b) through e) how many elements will the result contain?

- b) \_\_\_\_\_      c) \_\_\_\_\_      d) \_\_\_\_\_      e) \_\_\_\_\_

17. In the following situation:

```
DECLARE VA ARRAY(12) VECTOR(4) INITIAL(0);
DECLARE INTEGER, I INITIAL(1), J INITIAL(5), K INITIAL(3);
```

- a) Will this compile? VA\$(J AT K:\*) Ans. \_\_\_\_\_
- b) Will this compile? VA\$(3 TO 9:3 AT I) Ans. \_\_\_\_\_
- c) Will this compile? VA\$(5 AT K:3) Ans. \_\_\_\_\_
- d) Will this compile? VA\$(\*:1 TO 3) Ans. \_\_\_\_\_

18. True or False. In the following example the entire declared variable will be initialized to values of 1: Ans. \_\_\_\_\_

```
DECLARE BIG ARRAY(12,20,6) MATRIX(4,4) DOUBLE INITIAL(1);
```

19. True or False. The '#' repetition factor can be nested within an INITIAL or CONSTANT clause. Ans. \_\_\_\_\_

20. True or False. In a subscript the symbol '\*' means to accept the full range of the subscript (i.e., to perform no subscripting). In an INITIAL or CONSTANT clause the symbol '\*' means to bypass all remaining initialization. Ans. \_\_\_\_\_

21. True or False. All data is of STATIC type by default. Thus, adding the STATIC keyword is unnecessary – and in fact is prohibited for any data declared as CONSTANT or declared in COMPOOLS. Ans. \_\_\_\_\_

22. True or False. The keyword AUTOMATIC means that memory space for the declared variable is dynamically assigned at run time. Ans. \_\_\_\_\_

23. True or False. Use of the AUTOMATIC keyword will result in “hidden” initialization code which will set the variable to the initial value upon every entry into the code block. Ans. \_\_\_\_\_

24. True or False. The AUTOMATIC keyword plays a crucial role in making a PROCEDURE or FUNCTION truly reentrant. Ans. \_\_\_\_\_

25. True or False. In performing an assignment statement involving a mixture of Integers and Scalars of differing precisions, HAL/S determines its optimal strategy by first looking at the data type and precision of the left-hand-side (receiving) variable. Ans. \_\_\_\_\_

26. True or False. HAL/S automatically converts variables from INTEGER to SCALAR and from SINGLE to DOUBLE precision as necessary – although you can do this explicitly if you so desire using conversion functions. Ans. \_\_\_\_\_

27. True or False. Unlike all other data types CHARACTER strings are prefaced by a 2-byte header which records the maximum and current lengths of a character string. Ans. \_\_\_\_\_

28. True or False. A blank is used in HAL/S to indicate normal multiplication, including matrix multiplication, multiplication of a vector by a scalar, etc. However, it is also used to multiply two vectors in which case a MATRIX results. Ans. \_\_\_\_\_

29. True or False.  $M^{**T}$  means matrix transposition. Ans. \_\_\_\_\_

30. True or False.  $M^{**(-1)}$  means matrix inverse and the parentheses are required. Ans. \_\_\_\_\_

31. True or False. Matrices can be added provided that they are of identical precision. Ans. \_\_\_\_\_

32. True or False. The annotation marks which appear over a MATRIX (\*), VECTOR (-), BIT string (.) and CHARACTER string (,) always reflect whatever subscripting has been applied to the variable. Ans. \_\_\_\_\_

33. True or False. When subscripting arrays of BOOLEAN variables the “:” character must always follow the array subscript since BOOLEANs are really BIT(1) variables and thus potentially component-subscriptable. Ans. \_\_\_\_\_