

HAL/S PROGRAMMING FUNDAMENTALS QUIZ 5

1. Which of the following function header statements will compile successfully?

- A. ALPHA: FUNCTION CHARACTER(512);
- B. ALPHA: FUNCTION CHARACTER(*);
- C. ALPHA: FUNCTION CHARACTER(1);

Ans. _____

2. True or False. CHARACTER input arguments must be declared with their max length which must range from 1 to 255. CHARACTER assign arguments must be declared with the '*' length due to the more stringent constraints imposed on assigns.

Ans. _____

3. True or False. Input parameters to PROCEDURES and FUNCTIONS may be 1-, 2-, or 3-dimensional arrays. Assign parameters of PROCEDURES are restricted to 1-dimensional arrays and, of course, FUNCTIONS cannot have the array attribute.

Ans. _____

4. True or False. Array arguments (e.g., in the CALL statement) must always match their corresponding parameter in both the number of dimensions and the range of each dimension. The single exception is that 1-dimensional array parameters may use the '*' symbol to allow the array length to be determined at run time.

Ans. _____

5. True or False. ARRAY input arguments will always be converted automatically to the precision of the corresponding input parameter, e.g., an array of single-precision vectors will be converted to an array of double-precision vectors.

Ans. _____

6. True or False. In the following case the passed input argument must have an array length less than or equal to 6, but cannot be greater.

Ans. _____

```
STATE_UPDATE: PROCEDURE (ARR1) ASSIGN (ARR2);  
  DECLARE ARR1 ARRAY(6) SCALAR DOUBLE;  
  DECLARE ARR2 ARRAY(*) SCALAR DOUBLE;  
  ...  
CLOSE STATE_UPDATE;
```

7. Within a PROCEDURE or FUNCTION the actual length of a 1-dimensional array can be found by using the LENGTH function. This works regardless of whether the parameter had been declared with the '*' size or a literal size (e.g., 10).

Ans. _____

8. Which values will be returned by the following arithmetic HAL/S library functions?

CEILING(4.556)

Ans. _____

FLOOR(9.999)

Ans. _____

MIDVAL(2.5, 9.7, 6.3)

Ans. _____

DIV(31,3)

Ans. _____

ABS(-17.2)

Ans. _____

MOD(43,4)

Ans. _____

REMAINDER(31,3)

Ans. _____

ODD(41)

Ans. _____

9. What data type is returned by the ODD arithmetic function?

Ans. _____

10. Which values will be returned by the following arithmetic HAL/S library functions?

ROUND(4.7)

Ans. _____

TRUNCATE(11.3)

Ans. _____

SIGN(-23)

Ans. _____

SIGN(4)

Ans. _____

SIGN(0)

Ans. _____

SIGNUM(-23)

Ans. _____

SIGNUM(4)

Ans. _____

SIGNUM(0)

Ans. _____

11. What are the results of the following functions?

SHL(101,2)

Ans. _____

SHR(99,2)

Ans. _____

SHL(BIN'1011',3)

Ans. _____

12. True or False. The LENGTH function will return the current length of a HAL/S CHARACTER string. The SIZE function will return the current length (reflecting any subscripting) of a 1-dimensional array.

Ans. _____

13. True or False. The bit string operators are AND (&), OR (|), NOT (¬), and CAT (||). The exclusive OR operation can only be done via the XOR library function.

Ans. _____

14. What is the maximum number of bits in a HAL/S bit string?

Ans. _____

15. True or False. The leftmost bit in a HAL/S bit string is always numbered 1. The rightmost bit is always its declared length. Ans. _____

16. True or False. When initializing HAL/S bit strings with bit literals, strings that are too short are padded on the left with zeroes and strings that are too long are truncated from the left. Ans. _____

17. True or False. The following statement will get a compile error. Ans. _____

```
DECLARE BB9 BIT(9) CONSTANT(BIN'1011110111');
```

18. Which of the following will get compile errors? Ans. _____

```
DECLARE BB11 BIT(11) INITIAL(BIN'0');
```

```
DECLARE INTEGER I INITIAL(3);
```

```
DECLARE INTEGER J CONSTANT(5);
```

```
DECLARE INTEGER K INITIAL(12);
```

A) BB11\$I; B) BB11\$(J AT I); C) BB11\$(I AT J);

D) BB11\$(I TO J); E) BB11\$(K); F) BB11\$(J AT K);

19. What is the result of the following? Ans. _____

```
DECLARE BARR ARRAY(4) BIT(6) INITIAL(BIN'110111',BIN'111',  
BIN'1111001011',TRUE);
```

```
? = BARR$(3 AT 2:2 AT 3);
```

20. What bit strings result from the following?

```
DECLARE BITA BIT(4) INITIAL(BIN'1011');
```

```
DECLARE BITB BIT(6) INITIAL(BIN'110101');
```

```
DECLARE BITC BIT(8) INITIAL(HEX'F4');
```

```
? = BITA | BITC;
```

Ans. _____

```
? = BITA & BITB;
```

Ans. _____

```
? = BITA & NOT BITB;
```

Ans. _____

```
? = XOR(BITA,BITB);
```

Ans. _____

```
? = BITA || BITB;
```

Ans. _____

21. True or False. When concatenating two bit strings a runtime error will result if the length of the resultant string exceeds 32 bits. Ans. _____

22. What is the value of BITA? Ans. _____

```
DECLARE BITA BIT(11) INITIAL(BIN'11100010111');
```

```
DECLARE BITB BIT(7) INITIAL(BIN'1001110');
```

```
BITA(5 AT 4) = BITB(4 TO 6);
```

23. True or False. Bit strings declared as BIT(1) are exactly equivalent to variables declared as BOOLEAN. Ans. _____

24. True or False. Bit strings that are subscripted down to a single bit may be used in exactly the same way as a declared BOOLEAN variable. Ans. _____

25. True or False. Bit strings may be compared to see if they are equal or unequal provided that they are declared to be the same length – or subscripted so as to result in bit strings of the same length. Ans. _____

26. True or False. In passing an input argument to a PROCEDURE (or FUNCTION), the compiler will automatically (implicitly) convert bit strings to INTEGER or INTEGER to bit strings as required. Ans. _____

27. Which of the following statements are TRUE of bit string assign arguments? Ans. _____

- a) No component subscripting is allowed
- b) No array subscripting is allowed
- c) The assign argument must be a declared bit string
- d) The lengths of the bit string argument must exactly equal the length of the bit string parameter
- e) The bit string cannot be an ARRAY

28. True or False. If a FUNCTION is defined to be of BIT type then all of the following are true: Ans. _____

- a) The FUNCTION cannot be defined to be of type BIT(*)
- b) The FUNCTION must be BIT(1) through BIT(32)
- c) The FUNCTION may be defined to be of type BOOLEAN
- d) The FUNCTION must have a RETURN statement which returns a BIT variable or BIT expression.
- e) The bit string returned by the FUNCTION will be padded on the left with zeroes, or truncated on the left, so that its final length matches the declared length of the function.

29. True or False. Loss of upper bits in a bit string (truncation) is never flagged as an error, neither at compile-time nor run-time, nor during initialization, assignments, or parameter passing. Ans. _____

30. True or False. When doing array subscripting on an array of BOOLEANs, the trailing colon is optional (e.g., BOOL\$(I:;) Ans. _____