Solutions to Quick Check Questions

3

Numerical Data

3.1   Variables

1. Why are the following declarations all invalid?

    1 ——▶ int   a, b, a;
    2 ——▶ float   x, int;
    3 ——▶ float   w, int x;
    4 ——▶ bigNumber double;

    *1. The variable **a** is declared twice.*

    2. Reserved word int *cannot be used as an identifier.*

    *3. Need a semicolon after **w** instead of a comma or remove the reserved word* int.

    4. The order of data type and identifier is reversed.

2. Assuming the following declarations are executed in sequence, why are the second and third declarations invalid?

            int   a, b;

```
int      a;
float    b;
```

Because you are not allowed to declare the same identifier more than once.

3. Name six data types for numerical values.
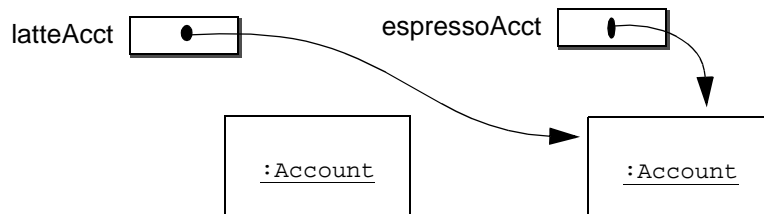
```
byte, short, int, long, float, double
```

4. Which of the following are valid assignment statements (assuming the variables are properly declared)?

```
Valid ———▶ x     =   12;
           12    =   x;    ◀——— Invalid
           y + y =   x;    ◀——— Invalid
Valid ———▶ y     =   x + 12;
```

5. Draw the state-of-memory diagram for the following code:

```
Account latteAcct, espressoAcct;

latteAcct     = new Account();
espressoAcct  = new Account();
latteAcct     = espressoAcct;
```


3.2 Arithmetic Expressions

1. Evaluate the following expressions:

```
a.  3 + 5 / 7
b.  3 * 3 + 3 % 2
c.  3 + 2 / 5 + -2 * 4
d.  2 * (1 + -(3/4) / 2) * (2 - 6 % 3)
```

a. 3

b. 10

c. −5

d. 4

2. What is the data type of the result of the following expressions?

```
a.  (3 + 5) / 7
b.  (3 + 5) / (float) 7
c.  (float) ( (3 + 5) / 7 )
```

a. int

b. float

c. float

3. Which of the following expressions is equivalent to $\dfrac{-b(c + 34)}{2a}$?

```
            a.  -b * (c + 34) /   2 * a
this ──▶    b.  -b * (c + 34) / (2 * a)
            c.  -b *   c + 34   / (2 * a)
```

   b

4. Rewrite the following statements without using the shorthand opera-
    tors.

```
a.  x += y;
b.  x * = v + w;
c.  x /= y;
```

a.   x = x + y;

b.   x = x * (v + w);

c.   x = x / y;

3.3   Constants

No Quick Check Questions.

3.4   Displaying Numerical Values

1. What is the purpose of the control characters?

    The control characters can be used to change the normal output sequence such as moving to the new line or skipping certain number of spaces by tabbing. The control characters are not displayed.

2. Which control character is used for a new line?

    Answer: **\n**

3. Using one print statement, output the following:

    ```
    Hello, world!
        My favorite Ben Franklin quote:

            An investment in knowledge
            always pays the best interest.
    ```

    Answer:

    ```
    System.out.print(
          "Hello, world!\n" +
          "    My favorite Ben Franklin quote:\n\n" +
          "          An investment in knowledge\n"   +
          "          always pays the best interest.\n");
    ```

3.5   Standard Input

1. Write a code fragment to input the height of a user in feet (int) and inches (int).

```
Scanner scanner = new Scanner(System.in);

System.out.print(
    "Enter height in ft & in (e.g. 5 11): ");

 int ft = scanner.nextInt( );

 int in = scanner.nextInt( );
```

2. Write a code to input the full name of a person and his or her age. The full name of a person includes the first and the last name.

```
Scanner scanner = new Scanner(System.in);
scanner.setDelimiter("\n");

System.out.print("Enter full name: ");

String fullname = scanner.next( );

System.out.println("Entered age: ");

int age = scanner.nextInt();
```

3. Write a code that creates a Scanner object and sets its delimiter to the pound sign.

```
Scanner scanner = new Scanner(System.in);
scanner.setDelimiter("#");
```

3.6   The Math Class

1. What's wrong with the following?

```
a.  y = (1/2) * Math.sqrt( X ) ;

b.  y = sqrt(38.0);

c.  y = Math.exp(2, 3);

d.  y = math.sqrt( b*b – 4*a*c) / ( 2 * a );
```

a. (1/2) is always 0.

b. Should be Math.sqrt.

c. No such Math *method. Use pow(x, y) to compute x to the y power*

d. The class name is Math, *not* math.

2. If another programmer writes the following statements, do you suspect any misunderstanding on the part of this programmer? What will be the value of y?

```
a.  y = Math.sin( 360 ) ;

b.  y = Math.cos( 45 );
```

Yes, most likely this programmer is thinking that he is passing the angles in degrees to the sin *and* cos *methods. The methods accept the angle in radians.*

a. y = 0.9589

b. y = 0.5253

3.7   Random Number Generation

1. What are the possible minimum and the maximum numbers assigned to num by the following statement?

```
int num = random.nextInt(15);
```

Answer: minimum of 0 and maximum of 14

2. Write a statement that assigns a random number between 1 and 4, inclusive, to an integer variable num.

int num = random.nextInt(4) + 1;

3. Write a statement that assigns a random number between *min* and *max*, inclusive, where 0 <= min < max, to an integer variable *num*.

```
int num = random.nextInt(max - min + 1) + min;
```

3.8   The GregorianCalendar Class

No Quick Check Questions.

3.9   Sample Program: Loan Calculator

No Quick Check Questions.

3.10   Numerical Representation (Optional)

No Quick Check Questions.