This pledged exam is open text book and closed notes. Different questions have different points associated with them. Because your goal is to maximize your number of points, we recommend that you do not dwell too long on any particular question during your first pass through the exam.

Unless specified all arrays are one-dimensional. Assume stdin is an initialized Scanner variable throughout the test.

Standard Java class Point for representing (x, y) locations is used throughout the test. Class Point has many methods. For our purposes assume the following public Point constructor and methods are always available.

- Point(): Configures a new Point object to represent the location (0, 0).
- Point(int a, int b): Configures a new Point object to represent the location (a, b).
- int getX(): returns the x-coordinate of its object.
- int getY(): returns the y-coordinate of its object.
- void setX(int v): sets the x-coordinate of its object to value v.
- void setY(int v): sets the y-coordinate of its object to value v.
- Object clone(): returns a new Point object that is a duplicate of its object.

1. (3 points) What section of CS101 are you in?

   _____ 2 CS101E
   _____ 3 0800-0915 Thursday
   _____ 4 0930-1045 Thursday
   _____ 5 1100-1215 Thursday
   _____ 6 1230-1345 Thursday
   _____ 7 1400-1515 Thursday
   _____ 8 1530-1645 Thursday
   _____ 9 1700-1815 Thursday
   _____10 1830-1945 Thursday
   _____11 2000-2115 Thursday
2. (3 points) Assume int array variable `score` has already been defined and initialized. Write a single statement that assigns the value 1 to the first element of array `score`.

3. (3 points) Assume int array variable `score` has already been defined and initialized. Write a single statement that assigns the value 1 to the last element of array `score`.

4. (3 points) Assume int array variable `data` has already been defined and initialized. Fill in the blanks in the following code segment that sets the value of variable `total` to the sum of the values in int array `data`.

   ```
   int total = 0;
   for (int i = 0; _____________ ; ++i) {
   _________________
   }
   ```

5. (3 points) Write a single statement that defines and initializes an int array variable `b` to reference a new array with 10 elements.

6. (3 points) Assume int array variable `c` has already been defined and initialized. Write a single statement that defines and initializes an int array variable `b` to reference the same array of int elements as array `c`.

Suppose the following code segment occurs in the body of some method.

   ```
   int[] a1;
   int[] a2 = null;
   int[] a3 = new int[0];
   int[] a4 = new int[2];
   ```

7. (2 points) TRUE FALSE Variable a1 references an array.

8. (2 points) TRUE FALSE Variable a2 references an array.

9. (2 points) TRUE FALSE Variable a3 references an array.

10. (2 points) TRUE FALSE Variable a4 references an array.
11. (4 points) Fill in the blanks in the following code segment that displays the number of integer extracted (read) from standard input. Assume `Scanner` variable `stdin` was initialized using the definition on page 1.

```java
int count = _____________________ ;

System.out.println("Enter a list of numbers using CTRL-Z to indicate");
System.out.println("when there are no more values");

while ( ________________________________ ) {
    int number = stdin.nextInt();

    ________________________________ ;
}

System.out.println( count );
```

12. (4 points) Fill in the blanks in the following code segment that displays each of the integer values it was able to extract (read) from standard input. Assume `Scanner` variable `stdin` was initialized using the definition on page 1.

```java
System.out.println("Enter a list of numbers using CTRL-Z to indicate");
System.out.println("when there are no more values");

while ( ________________________________ ) {
    int number = stdin.nextInt();

    ________________________________ ;
}
```

13. (4 points) In twenty words or less explain why the following legal code segment may not produce any output. Assume `Scanner` variable `stdin` was initialized using the definition on page 1.

```java
while ( stdin.hasNext() ) {
    String s = stdin.nextLine();
    System.out.println ( s );
}
```

14. (4 points) In twenty words or less explain why the while loop in the following legal code segment may not terminate. Assume `Scanner` variable `stdin` was initialized using the definition on page 1.

```java
while ( stdin.hasNext() ) {
    System.out.println ( "Rinse, lather, repeat" );
}
```
15. (5 points) Fill in the blanks in the definition for boolean method `hasIt()`. The method takes a single `int` array parameter named `data` and returns whether or not an element of array `data` has the value 101. You may assume that `data` has at least one element.

```java
public boolean hasIt( __________________________ ) {
    for (int i = 0; i < _________________ ; ++i ) {
        if ( ____________________________ ) {
            ________________________________;
        }
    }
    _________________________________;
}
```

16. (4 points) Fill in the blanks in the definition for method `makeArray()`. The method at takes a single `int` parameter named `n`. The method returns a new `int` array with `n` elements.

```java
public _____________________ makeArray( int n ) {
    _________________________________;
    return result;
}
```

17. (5 points) Fill in the blanks in the definition for method `makeMatrix()`. The method takes two `int` parameters named `m` and `n` respectively. Method `makeMatrix()` returns a new two-dimensional array with `m` rows where each row has `n` elements. In performing its task, the method makes use of method `makeArray()` from the previous question.

```java
public _____________________ makeMatrix( int m, int n ) {
    _________________________________;
    for ( _________________________________ ) {
        _____________________________ = makeArray( ____________________________ );
    }
    return result;
}
```
18. (4 points) Consider the following code segment.

```java
int counter1 = 0;
int counter2 = 0;
int counter3 = 0;
int counter4 = 0;
for (int i = 0; i < 10; ++i) {
    ++counter1;
    for (int j = 0; j < 10; ++j) {
        ++counter2;
    }
    for (int j = 0; j < 10; ++j) {
        ++counter3;
    }
    ++counter4;
}
System.out.println("counter1 = "+counter1);
System.out.println("counter2 = "+counter2);
System.out.println("counter3 = " + counter3);
System.out.println("counter4 = " + counter4);
```

What output does it display?

- counter1 = ________________
- counter2 = ________________
- counter3 = ________________
- counter4 = ________________

In Questions 19–22 suppose only the following `display()` methods are available. Not all of the invocations in these questions are legal.

- public void display(int x, double y): displays the **sum** of x and y to standard output.
- public void display(int x, int y): displays the **product** of x and y to standard output.

19. (2 points) What is the result of attempting the invocation `display(4, 5)`.

20. (2 points) What is the result of attempting the invocation `display(4.0, 5.0)`.

21. (2 points) What is the result of attempting the invocation `display(4, 5.0)`.

22. (2 points) What is the result of attempting the invocation `display(4.0, 5)`.  

23. (4 points) Complete the definition of void method reverse() that takes a single int array parameter named x. Method reverse() reverses the order of the element values in x. You may assume x has at least one element.

```java
public void reverse ( ______________________________ ) {
    int n = ______________________________ ;
    for (int i = 0; i < n; ++i ) {
        ______________________________ ;
    }
}
```

24. (2 points) Consider the following code segment.

```java
Point p = new Point(1, 1);
Point q = new Point(1, 1);
Point r = (Point) p.clone();
boolean flag1 = ( p == q );
boolean flag2 = ( p == r );
System.out.println( "flag 1 = " + flag1 );
System.out.println( "flag 2 = " + flag2 );
```

What output does it produce?

flag1 = _____________________

flag2 = _____________________

25. (4 points) Complete the definition of void method fill() that takes two parameters: an int array name x and int named v. Method fill() copies the value of v to all of the elements in x. You may assume x has at least one element.

```java
public void fill ( ________________________________ ) {
    int n = ______________________________ ;
    for (int i = 0; i < n; ++i ) {
        ______________________________ ;
    }
}
```
26. (6 points) Complete the definition and initialization of a `Point` array named `b`. Array `b` is to be a deep copy of array `a`. For example, if array `a` represents the locations (1, 2), (2, 3), and (3, 4), then the memory diagram for arrays `a` and `b` would be:

```
<table>
<thead>
<tr>
<th>a[0]</th>
<th>a[1]</th>
<th>a[2]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

```
<table>
<thead>
<tr>
<th>b[0]</th>
<th>b[1]</th>
<th>b[2]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

after the code completes. You may assume `a` has at least one element.

```java
int n = a.length;

__________________________ b = ____________________________________ ;

for (int i = 0; i < n; ++i ) {
    int x = __________________________ ;
    int y = __________________________ ;
    Point ithDuplicate = new Point(x, y);
    __________________________ = ithDuplicate;
}
```
27. (4 points) Suppose \( f() \) is a void method that takes a single int as its parameter. In twenty words or less explain why 101 must be displayed by the following legal code segment.

```java
int n = 101;
f(n);
System.out.println ( n );
```

28. (4 points) Suppose \( g() \) is a void method that takes a single Point as its parameter. In twenty words or less explain why 101 may not be displayed by the following legal code segment.

```java
Point p = new Point(101, 101);
g(p);
System.out.println ( p.getX() );
```

29. (4 points) Suppose \( h() \) is a void method that takes a single Point as its parameter. In twenty words or less explain why false is always displayed by the following legal code segment.

```java
Point p = new Point(101, 101);
Point q = (Point) p.clone();
h(p);
if ( p == q ) {
    System.out.println ( "true" );
}
else {
    System.out.println ( "false" );
}
```

30. (4 points) Suppose \( i() \) is a void method that takes a single Point as its parameter. In twenty words or less explain why 101 is always displayed by the following legal code segment.

```java
Point p = new Point(101, 101);
Point q = (Point) p.clone();
i(p);
System.out.println ( q.getX() );
```