

Best of Texas 2024-2025 – Test 1

Key: #-1st yr material
 #+-1st yr material, second semester
 ^ 1st year do-able, but not practiced
 @-other, but introduced
 \$- 1 second year
 U – I don't teach, but it's on UIL list

1. $165_8 + 510_8 =$

@

- a. 695_8
- b. 585_8
- c. 605_8
- d. 595_8
- e. 675_8

Topic: Number systems, addition. No conversion needed, carry on 8 instead of 10



Solution:
 165
 510
 675 – Carry on 8 wasn't needed.

2. Given the statements at right, which of the following are valid assignments?

□

- a. `n1 = (int) n2;`
- b. `n1 = n2;`
- c. `n1 = (int) n3;`
- d. more than one of the above

Topic: Number systems, addition. No conversion needed, carry on 8 instead of 10



`int n1 = 4;`
`double n2 = 8;`
`String n3 = "7";`

Solution: a) `int = int` ok
 b) `int = dbl` fails – loss of precision
 c) cannot cast an object to a primitive type

3. What is the output of the code segment at right?

+ □

- a. 2
- b. 8
- c. 9
- d. 012122
- e. 012012012

Topic: nested loop, loop control variables, inner loop based on outer loop control variable
 AP CS A covers in chapter 6
 Use variable trace



`for (int a = 0; a < 3; a ++)`
`for (int b = a; b < 3; b ++)`
`out.print(b);`

Solution

a	b	
0	0	0
	1	1
	2	2
	3	
1	1	1
	2	
2		
	3	
2	2	

4. What is the output of the code segment at right?

□

- a. 3
- b. 345
- c. 4
- d. 5
- e. none of the above

Topic: String Methods, String literal
 Return methods



`String str = "Computer Science";`
`out.print (str.indexOf("put"));`

Solution: indexes start at 0
 Computer Science
 0 1 2 3 4 5 6 7
 Returns: 3 (starting index only of first occurrence of put)

5. What is the output of the code segment at right?

□

- a. t
- b. y
- c. werty
- d. 4
- e. 5

Topic: String Methods, String literal
 Return methods
 Overloaded indexOf not tested in AP CS A



`String s1 = "qwerty";`
`String s2 = "ty";`
`out.print(s1.indexOf(s2,1));`

Solution: indexes start at 0,
 2nd parameter is the starting index
 qwer ty
 0 1 2 3 4 5 starts looking at index 1 / w
 Returns: 4 (starting index only of first occurrence of ty)

6. What is the output of the code segment at right?

+ □

- a. 1
- b. 2
- c. 3
- d. 4

Topic: 1D array, prefix unary shortcut(not AP CS A)
 arrays are chapter 7



`int[] ar = {1,2,3,4,5};`
`int i = 1, value;`
`value = ar[++i];`
`out.println (value);`

Solution: initializer list used to fill array – so 1 is at index 0, 2 at index 1, etc.
 ++i is the index – it adds 1 before using it so `ar[2]` is returned

Topic: random number generator
 Cast to an int

Solution:
 Random method `nextInt` will return a number between 0 & one less than the parameter



7. The code segment at right could output which of the following values?

- a. -1
- b. 0
- c. 4
- d. more than one of the above


```
Random r = new Random ();  
out.println((int)(r.nextInt (4)));
```

8. What is the output of the code segment at right?

- a. 7
- b. 8
- c. 9
- d. 12
- e. error

```
String s = "sixty-one";  
int length = s.length();  
out.print(length);
```

9. What is the output of the code segment at right?


- a. 0
- b. 1
- c. 32
-  d. There is an error in the code.

Topic: binary shortcut operator

```
out.print ('a' /= 2);
```

Solution: this is an error as you cannot assign a value to a char literal.

10. What is the output of the code segment at right?


- a. no output
- b. 0
- c. null
-  d. VariableNotIntitizedException
- e. syntax error

Topic: declare & initialize variables

```
String str;  
out.print(str);
```

Solution: str is correctly declared, but you cannot use it's value such as sending to be printed if it was never initialized. The compiler will catch this issue.(syntax). It has to compile to be run where it would flag an exception, but it won't compile

11. What is the value of x following execution of the code segment at right?

- a. 0
- b. 3
- c. 4
-  d. 5
- e. error

Topic: prefix unary operators
Ternary operator (does an if/else)
Pemdas order of operations

```
int x, y = 3, z = 4;  
x = ++y < ++z ? ++y : ++z;
```

Solution: order of operations will do the prefix unary operators before using the values so $y < z$ will be $4 < 5$. The ? is basically making it an if. If true, it does the ++y, otherwise it does the thing after the : which is ++z. If doing ++y, that value goes into x, otherwise the new value of z will.

```
Same as  
If (++y < ++z)  
    ++y  
else  
    ++z
```

Solution: prefix unary operator will do the ++ or -- before using it. Postfix unary operator will use it's

12. What is the value of x following execution of the code segment at right?

- a. -1
- b. 0
- c. 1
- d. 2
- e. 12

```
int x = 12; int y = 15;
while (y >= 0)
{
    x = x--;
    y = --y;
}
```

13. What is the value of y following execution of the code segment at right?

- a. -2
- b. -1
- c. 0
- d. 1
- e. 15

14. What is the output of the code segment at right?

- a. 2
- b. 5
- c. 7
- d. error

Topic 1D array, initializer list, ArrayList

```
int[] ar = {3,5,7,9};
out.print(ar.get(2));
```

Solution: Initializer list will fill the array with 3 going to index 0, 5 to index 1, etc get is simply an accessor but the method belongs to the ArrayList class and cannot be used on an array

15. What is the output of the code segment at right?

- a. true
- b. false
- c. 0
- d. error

Topic: String method equals/equalIgnoreCase

```
String str1 = "equals";
String str2 = "EqUaLs";
out.print(
    str1.equalsIgnoreCase(str2));
```

Solution: it prints true if, ignoring case, str1 exactly matches str2. Otherwise it prints false

16. What is the output of the code segment at right?

- a. truefalse
- b. true>true
- c. false>true
- d. false>false

Topic: String method matches with regular expression (regex)
Pattern: * -> 0 or more
^ start of string when not in []
.matches any character

```
String s = "Howdy";
out.print(s.matches(".*^"));
out.println(s.matches("[^H]"));
```

Solution: true if the implicit matches the pattern in explicit parameter it prints false
[^H] – only 1 letter not H

17. What is the output of the code segment at right?

- a. 0
- b. 1
- c. 2
- d. 10
- e. none of the above

Topic: Loop, 1D array, unary & binary shortcuts
Loops are chapter 6, 1D array chapter 7

```
int arr [] = new int[5];
int n = 1, sum = 0;
for (int i = 0; i < 5; i++){
    arr[i] = n;
    while (n >= 0){
        sum += arr[i];
        n--;
    }
}
out.print (sum);
```

Solution: arr is filled with 00000 indexes 0 – 4
Loops on 0 – 4 and stores a 1 in each spot
While loop only loops 2 (on 1 & 0) time so sum is 2

18. Given the code segment at right, which of the following statements is true.

Topic: if, bitwise or, test equality & relational

```
int x = 4, y = 5;
if (x < 4 | y == 5)
    out.print (x + y);
```

Solution: | is bitwise or so convert to binary
4 < 4 is false, y==5 is true
False | true → 0 | 1 → 1 (true)
It does NOT short-circuit
Since if is true, it will print 9 result of (4 + 5)

- a. When executed, the output will be 9.
- b. When executed, there will be no output.
- c. "y == 5" will not be evaluated due to short-circuit evaluation.
- d. The code will generate a syntax error.
- e. More than one of the above statements are true.

19. What is the output of the code segment at right when called with m(10)?

```
public static void m(int x){
    if (x > 0)
        m(x / 2 + 1);
    out.print(x);
}
```

Solution: arr is filled with 00000 indexes 0 - 4
Loops on 0 - 4 and stores a 1 in each spot
While loop only loops 2 (on 1 & 0) time so sum is 2

- a. -101234610
- b. 01234610
- c. 1234610
- d. 012346
- e. error

Topic: if (ch 5)
Recursion (ch 5)

20. In Java, the type *char* requires the same memory as _____.

Topic: primitive data types (ch 4)

- a. int
- b. byte
- c. float
- d. A and B
- e. none of the above

Solution:
char needs 2 bytes
int needs 4 bytes
byte needs 1 byte
float uses 4 bytes

21. Given the code segment at right, which of the following are valid statements?

```
List <Double>list = new ArrayList
<Double> ();
```

```
double d = 3.5;
int i = 4;
```

Solution: add is in List interface & ArrayList class. It only holds objects, but will autobox d into a Double object to add it. Cannot convert Integer object to double object

- a. list.add(d);
- b. list.add(new Double(d));
- c. list.add(new Integer(i));
- d. a and b only
- e. b and c only

Topic: List interface, ArrayList, Generic types, autoboxing/unboxing

22. What is the output of the code segment at right?

```
boolean x = true, y = false;
out.print((x && y) && (!x || !y));
```

- a. true
- b. false
- c. error

Topic: Boolean Logic, Logical operators, short circuiting can be helpful (ch 5)

Solution: && is only true if both are true so (true && false) is false. Short circuiting says if you know the answer after looking at first part of condition, you don't look at 2nd part. That is the case here. However if you didn't know that: !x is false, !y is true || those to get a true false && true is false

Solution: need to trace:

23. What is the output of the code segment at right when called with m(6)?

- a. 0
- b. 1
- c. 2
- d. 4
- e. 5

```
public static int m (int x){
    if(x <= 1)
        return 1;
    else
        if (x % 2 == 0)
            return x - m(x-1);
        else
            return x + m(x-1);
}
```

24. What is the output of the code segment at right?

- a. 13
- b. 23
- c. 123
- d. An exception will be thrown.

```
List <String>list = new
    ArrayList<String> ();
list.add("1");
list.add("2");
list.add("3");
list.remove(1);
Iterator <String> iter = list.iterator ();
while (iter.hasNext ())
    out.print(iter.next ());
```

25. What is the output of the code segment at right?



- a. 3
- b. 4
- c. 5
- d. 6
- e. none of the above

Topic: String, regex, array

```
String str = "one\n"+
    "two\n\tthree";
String[] nums =str.split("\\s+");
out.println(nums.length);
```

\s splits on whitespace
Must use two \ in String due to escape sequence
Creates array [one, two, three] length is 3

26. Assuming *i* and *j* are of type *int* and *x* and *y* are of type *double*, which of the following is a valid call of the method at right?

- a. m(i * j)
- b. m(i * x)
- c. m(x * y)
- d. all of the above
- e. 2 of the above

Topic: method call, parameter / signature matching. Data types

```
public static double m (int num){
    return num - 1;
}
```

Signatures:
a) m int
b) m double
c) m double
method heading is m int
only a is a match
Note an int can match to double, but not the reverse.

27. What is the output of the code segment at right?

- a. true
- b. false
- c. 2468
- d. nothing will be printed

Topic: boolean logic, arrays, looping

```
int []list = {2, 4, 6, 8};
boolean test = true;
for (int i = 0; i < list.length; i++)
    test = test && (list[i] % 2 == 1);
out.print (test);
```

Starts with filled array
Uses = to assign test to test and odd number

1	test	test && odd #
0	true	true && false (2)
1	false	false && false (4)
2	false	false && false (6)
3	false	false && false (8) →

+ □

28. In order for the code at right to compile, what data type could num be?

- a. Integer
- b. double
- c. both of the above

Topic: data types and Wrapper Classes

```
num = new Integer(10);
```

Integer class is a wrapper class. Java will automatically convert from Integer object to int primitive type
An Integer can be stored in same type, int and because an int can store in double, it can too.

\$

29. Using Big-O analysis, which of the following best estimates how many asterisks will be printed when the code at right is executed?

- a. O(n)
- b. O(2n)
- c. O(n²)
- d. O(n⁴)
- e. O(2)

Topic: Big-O efficiency

```
for(int i = 0; i < n; i++){
  for(int j = 0; j < n; j++){
    out.print("***");
  }
}
```

Outer loop executes n times. Each time it loops, the inner loop runs n times. So n * n times

16 8 4 2 1
1 0 1 1 1->23
10 10 10->
23 + 10 is 33

□

30. What is the output of the computation at right?

- a. 32
- b. 33
- c. 11121
- d. 100001

Topic: boolean logic, arrays, looping

```
int one = Integer.parseInt("10111", 2);
int two = Integer.parseInt("1010", 2);
out.println(one + two);
```

parseInt converts String to int. This is overloaded with the 2 meaning it is ...

+ □

31. Which of the following resembles the table created by the code at right?

- a.

0	2	4
1	4	16
2	8	32
- b.

0	1	2
1	2	4
2	4	16
- c.

0	1	4
1	2	5
2	3	6
- d.

0	1	4
1	2	6
2	3	9

Topic: 2D arrays and nested for loops

```
int[][] table = new int [3][3];
for (int i = 0; i < 3; i++)
  for (int j = 0; j < 3; j++)
    table[i][j] = i + (int) Math.pow(j,2);
```

Array is filled with zeros by default

i	j	Math.pow
0	0	0, 2 + i -> 0
	1	1, 2
	2	2, 2
	3	
1	0	0, 2
	1	1, 2
	2	2, 2
	3	
2	0	0, 2
	1	1, 2
	2	2, 2
	3	
3	stop	

32. If class C is to inherit features from both class A and class B, it can be defined as follows:

Topic: inheritance

- a. public class C extends A extends B
- b. public class C extends A, B
- c. public class C extends A, extends B
- d. public class C extends A && extends B
- e. None of the above. A class cannot extend two other classes.**

E is correct – in java, a class can only extend one class (inherit from). However if B extends A and C extends B, then C would get methods and data from A & B, but it didn't state that relationship, so e is the answer.

33. What is printed by the code segment at right?

Topic: static methods & variables, recursion

- a. 0
- b. 3
- c. 6
- d. 9**
- e. none of the above

```
public class MyClass {
    static int i;

    public static void main(String[] args) {
        System.out.println(n(3,3));
        // This location for #34
    }

    public static int n(int x, int y) {
        ++i;
        if (y <= 0)
            return x * y;
        else
            return x + n(x, y-1);
    }
}
```

x	y	i	return
3	3	0.1	3 + n(3,2) ->
9			
3	2	2	3 + n(3,1) -
> 6			
3	1	3	3 + n(3,0) -
> 3			
3	0	4	3 * 0 -> 0

34. What is the value of i at the location indicated at right?

Topic: static methods & variables, recursion

- a. 0
- b. 3
- c. 4**
- d. i is undefined
- e. none of the above

35. Given that que is a queue object, that is output by the code segment at right?

Topic: queue -add to one end, remove from the other

- a. redblue
- b. blueyellow
- c. redredblueblue**
- d. redbluegreenyellow

```
que.enqueue("red");
que.enqueue("blue");
que.enqueue("green");
que.enqueue("yellow");
out.print(que.peekFront());
out.print(que.dequeue());
out.print(que.peekFront());
out.print(que.dequeue());
```

Enqueue adds to end
 peekFront looks at next thing to remove, but doesn't remove it.
 Dequeue removes thing in front
 [red, blue, green, yellow]
 Print but keep red
 Print removed red
 Print blue, but keep
 Print/remove blue
 Leaves [green, yellow]

36. What is the output of the code segment at right?

Topic: loop and shortcut operators

- a. 6
- b. 1 3 5
- c. 7
- d. 3 5 7
- e. none of the above**

```
int num = 1;
while (num != 6)
    num += 2;

out.println(num + "");
```

num	print
1	
3	
5	
7	
9	
Infinite loop so never prints	

I is initialized outside of loop. This is valid.


Topic: loops and String methods

37. What is the output of the code segment at right?

- a. test
- b. tttt
- c. ttetes
- d. tttetes
- e. error

```
String str= "test";
int i = 0;
for (; i < str.length ();i++)
    out.print (str.substring(0,i));
```


38. Which of the statements at right will cause an error?

- a. I
-  b. II
- c. III
- d. more than one of the above
- e. none of the above

Topic: data types and size

- I. byte b = 20;
- II. float f = 3.5;
- III. short s = 110;

I --byte holds -128 to + 127 so is ok
II – to assign float, must have f on number 3.5f so is error
III short is twice the space of byte so is fine

 39. What is the output of the code at right?

(Free Response: Write your answer on the blank on the answer sheet.)

Topic: shortcut operators, scope of variables, static class variable vs local variable


```
n print // n is class var
4
5 // n++
In brackets is local n
It goes 10, then 11, then goes away when block ends
```

f(n) calls the method
nn is init to 5
nn becomes 7 (5 + 2)
prints 7 inside method

note: class C static n is still 5

```
public class C
{
    private static int n;
    public static void main (String[]args){
        n = 4;
        n++;
        {
            int n = 10;
            n++;
        }
        f(n);
    }
    public static void f (int nn){
        nn += 2;
        out.print (nn);
    }
}
```

 7

 40. What is the output of the code segment at right?

(Free Response: Write your answer on the blank on the answer sheet.)

Topic: String methods, escape sequence

```
String str = "\"abracadabra\"";
out.println(str.indexOf ("ra"));
```

The String holds a " at index 0
A at index 1, b at index 2, ra at 3 & 4
indexOf returns starting index only