

Exercises: Conditionals

Code Reading

Write out the truth tables for the following statements.

1. $P \ || \ !Q \ \&\& \ P$

Solution:

P	Q	!Q	!Q && P	P !Q && P
0	0	1	0	0
0	1	0	0	0
1	0	1	1	1
1	1	0	0	1

2. $!(P \ \&\& \ Q) \ || \ R$

Solution:

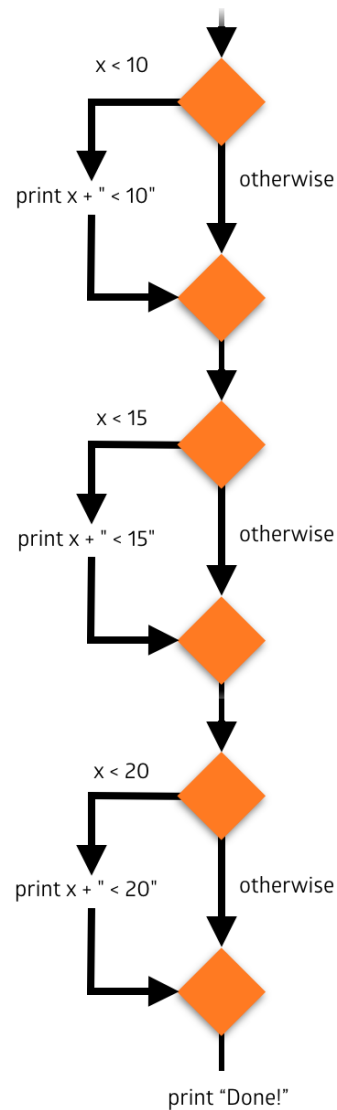
P	Q	R	P && Q	!(P && Q)	!(P && Q) R
0	0	0	0	1	1
0	0	1	0	1	1
0	1	0	0	1	1
0	1	1	0	1	1
1	0	0	0	1	1
1	0	1	0	1	1
1	1	0	1	0	0
1	1	1	1	0	1

3. What is the output from the following code when $x = 12$? When $x = 17$? When $x = 25$? Also draw out the control flow diagram for this code to help your understand how it works.

```
1  if (x < 10) {  
2      System.out.println(x + " < 10");  
3  }  
4  if (x < 15) {  
5      System.out.println(x + " < 15");  
6  }  
7  if (x < 20) {  
8      System.out.println(x + " < 20");  
9  }  
10  
11 System.out.println("Done!");
```

Solution:

// x = 12	// x = 17	// x = 25
12 < 15	17 < 20	Done!
12 < 20	Done!	
Done!		



4. What is the output from the following code when $x = 12$? When $x = 18$? When $x = 22$? Also draw out the control flow diagram for this code to help your understand how it works.

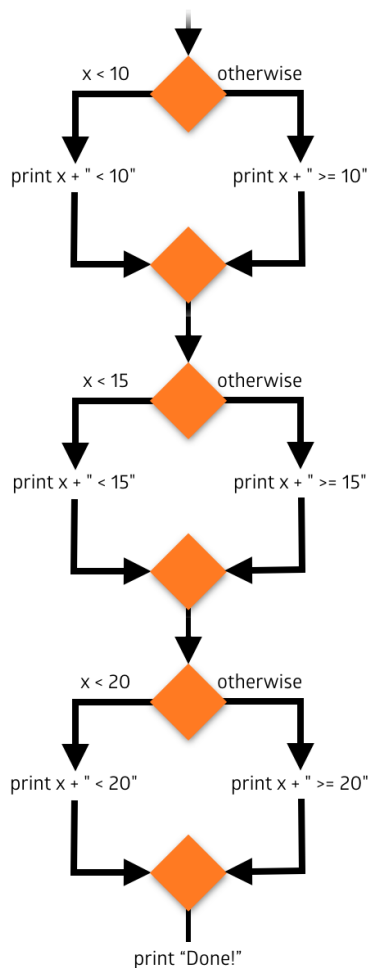
```

1  if (x < 10) {
2      System.out.println(x + " < 10");
3  } else {
4      System.out.println(x + " >= 10");
5  }
6  if (x < 15) {
7      System.out.println(x + " < 15");
8  } else {
9      System.out.println(x + " >= 15");
10 }
11 if (x < 20) {
12     System.out.println(x + " < 20");
13 } else {
14     System.out.println(x + " >= 20");
15 }
16
17 System.out.println("Done!");

```

Solution:

// x = 12	// x = 17	// x = 22
12 >= 10	17 >= 10	22 >= 10
12 < 15	17 >= 15	22 >= 15
12 < 20	17 < 20	22 >= 20
Done!	Done!	Done!

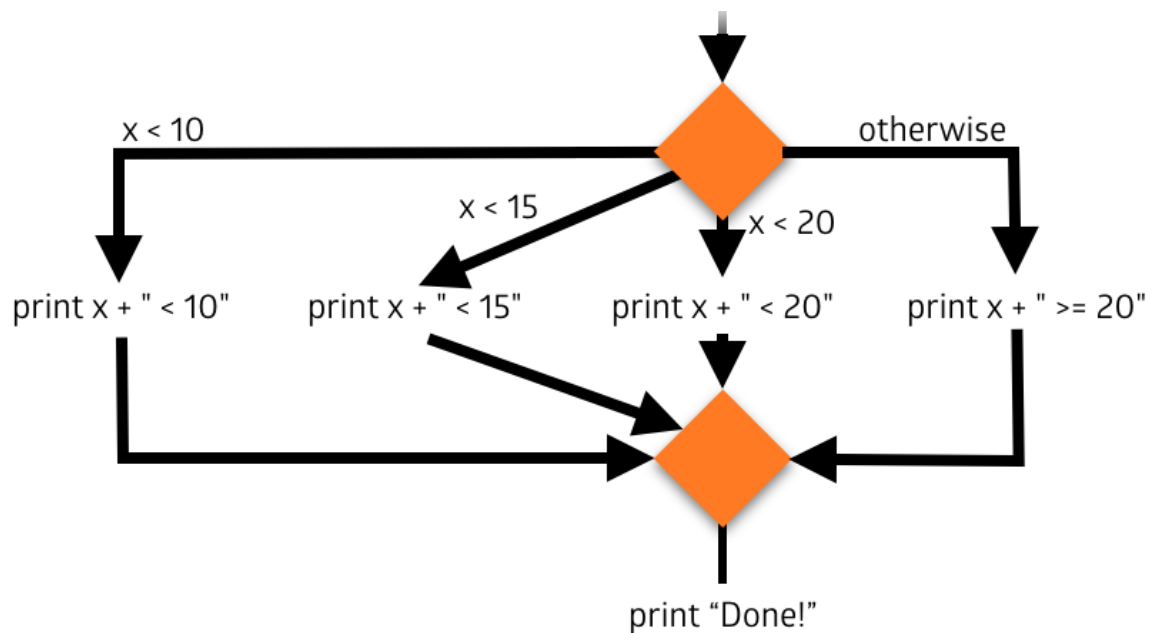


5. What is the output from the following code when $x = 12$? When $x = 15$? When $x = 22$? Also draw out the control flow diagram for this code to help your understand how it works.

```
1  if (x < 10) {
2      System.out.println(x + " < 10");
3  }
4  } else if (x < 15) {
5      System.out.println(x + " < 15");
6  }
7  } else if (x < 20) {
8      System.out.println(x + " < 20");
9  }
10 } else {
11     System.out.println(x + " >= 20");
12 }
13
14 System.out.println("Done!");
```

Solution:

<pre>// x = 12 12 < 15 Done!</pre>	<pre>// x = 15 15 < 20 Done!</pre>	<pre>// x = 22 22 >= 20 Done!</pre>
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6. What is the output from the following code when $x = 7$? When $x = 12$? When $x = 18$? Also draw out the control flow diagram for this code to help your understand how it works.

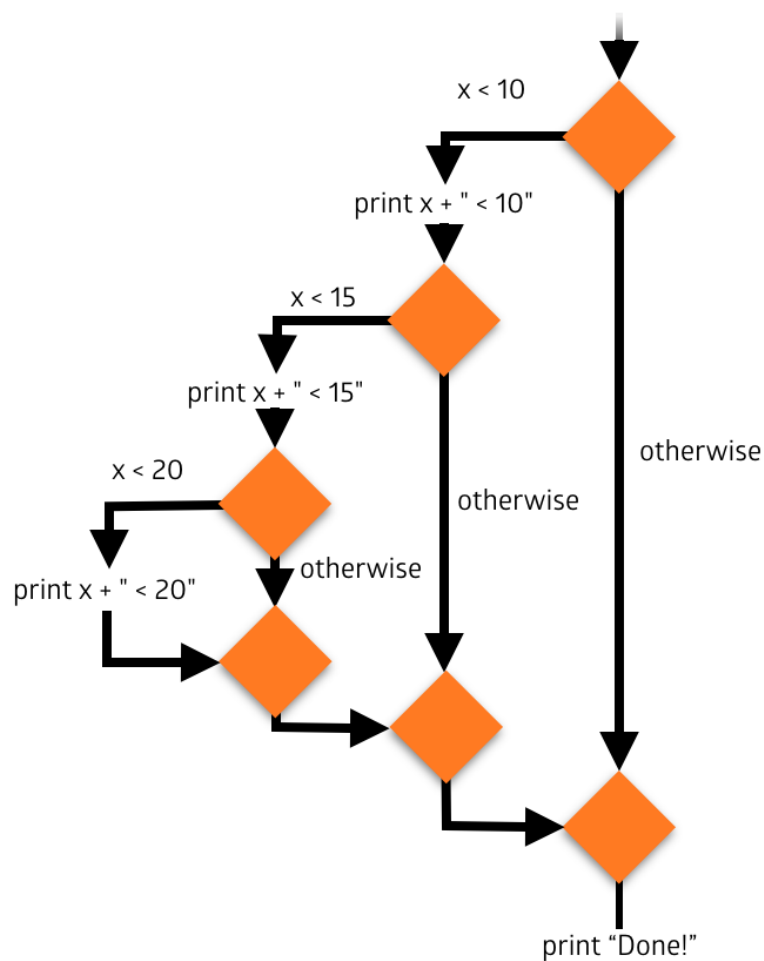
```

1  if (x < 10) {
2      System.out.println(x + " < 10");
3
4      if (x < 15) {
5          System.out.println(x + " < 15");
6
7          if (x < 20) {
8              System.out.println(x + " < 20");
9          }
10     }
11 }
12
13 System.out.println("Done!");

```

Solution:

<code>// x = 7</code>	<code>// x = 12</code>	<code>// x = 18</code>
<code>7 < 10</code>	<code>Done!</code>	<code>Done!</code>
<code>7 < 15</code>		
<code>7 < 20</code>		
<code>Done!</code>		



7. What is the output from the following code when $x = 7$? When $x = 16$? When $x = 23$? Also draw out the control flow diagram for this code to help your understand how it works.

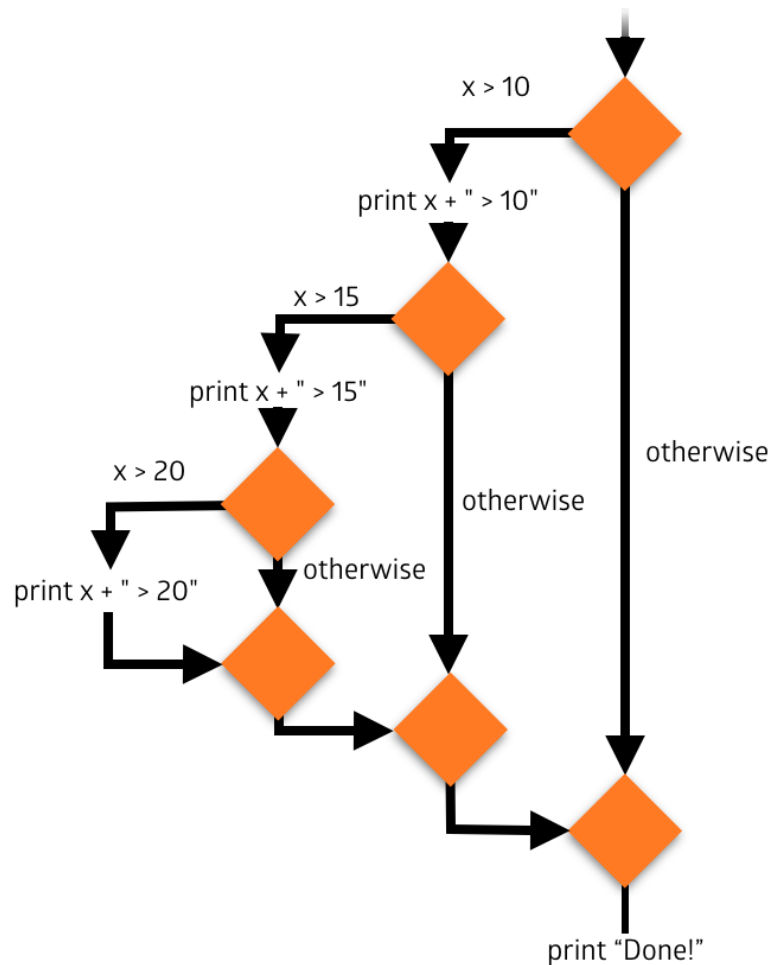
```

1  if (x > 10) {
2      System.out.println(x + " > 10");
3
4      if (x > 15) {
5          System.out.println(x + " > 15");
6
7          if (x < 20) {
8              System.out.println(x + " < 20");
9          }
10     }
11 }
12
13 System.out.println("Done!");

```

Solution:

<code>// x = 7</code>	<code>// x = 16</code>	<code>// x = 23</code>
Done!	16 > 10	23 > 10
	16 > 15	23 > 15
	16 < 20	Done!
	Done!	



8. What is the output from the following code when $x = 7$? When $x = 18$? When $x = 10$? Also draw out the control flow diagram for this code to help your understand how it works.

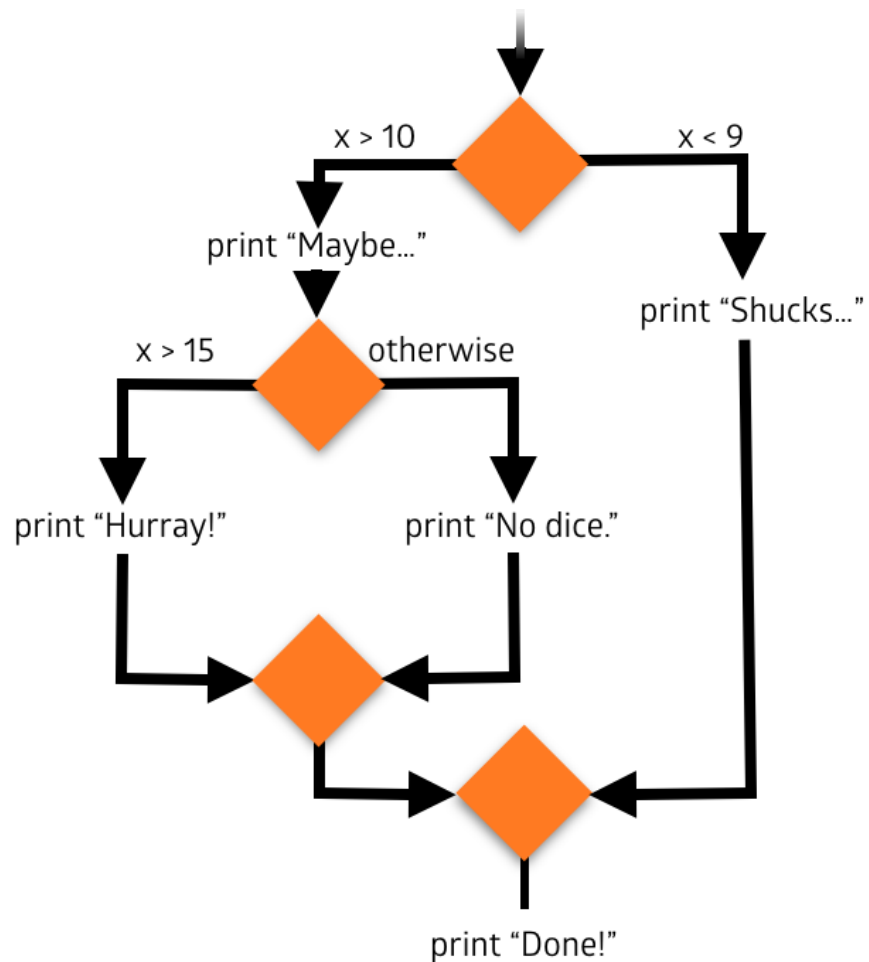
```

1  if (x > 10) {
2      System.out.println("Maybe...");
3
4      if (x > 15) {
5          System.out.println("Hurray!");
6      } else {
7          System.out.println("No dice.");
8      }
9
10 } else if (x < 9) {
11     System.out.println("Shucks...");
12 }
13
14 System.out.println("Done!");

```

Solution:

<code>// x = 7</code>	<code>// x = 18</code>	<code>// x = 10</code>
Shucks...	Maybe...	Done!
Done!	Hurray!	
	Done!	



9. What are the values of `x`, `y`, and `z` at the end of this code? Also draw out the control flow diagram for this code to help your understand how it works.

```
1  int y = 5, x = 16;
2  double z = 2.2;
3
4  y = 13 % 5; // y = 3
5
6  z = z * y + 4; // z = 10.6
7
8  if ( x <= z ) { // false
9      if ( y % 2 == 0 ) {
10         x = y / 5 + 2;
11     }
12
13     if ( y % 2 == 1 ) {
14         x = y + 5;
15     } else {
16         x = 7 * y;
17     }
18
19     z = 1.1 + (int)3.1 * y;
20
21     x++;
22
23 } else {
24     if ( x % 2 != 0 ) { // false
25         y = x / 5 + 7;
26     }
27
28     if ( x % 3 == 1 ) { // true
29         y = y + x + 5; // y = 24
30     }
31
32     x = (int)(z * 3.0); // x = 31
33
34     y++; // y = 25
35 }
```

Solution:

```
x = 31
y = 25
z = 10.6
```


Code Writing

10. Write code to determine whether or not a given integer is divisible by 3. Print the result (e.g., “Divisible by 3.” or “Not divisible by 3.”).

Solution:

```
import java.util.Scanner;
import java.util.DecimalFormat;

public class DivByThree {

    public static void main(String[] args) {

        int num = ...; //assume this has been initialized to some value

        if (num % 3 == 0) {
            System.out.println("Divisible by 3.");
        } else {
            System.out.println("Not divisible by 3.");
        }

    }

}
```

11. Write code that, for a given number, prints “Fizz” if the number is divisible by 3, “Buzz” if the number is divisible by 5, and “Fizz Buzz” if the number is divisible by both. There are many possible answers to this problem, so be sure to type yours up and try it out in Eclipse! Be sure to pay careful attention to the ordering of your conditions.

Solution:

```
import java.util.Scanner;
import java.util.DecimalFormat;

public class FizzBuzz {

    public static void main(String[] args) {

        int num = ...; //assume this has been initialized to some value

        if (num % 15 == 0) {
            System.out.println("Fizz Buzz");
        } else if (num % 3 == 0) {
            System.out.println("Fizz");
        } else if (num % 5 == 0) {
            System.out.println("Buzz");
        }

    }

}
```