

Practice Solutions

1. true
2. true
3. true
4. true
5. false

2. When Java sees a `&&` or `||` operator, the expression on the left side of the operator is evaluated first. If that is enough to determine the truth value of the overall statement, Java doesn't evaluate the right expression.

For example, in `true && true || (5 < 10)`, `5 < 10` is never evaluated.

3. Write a method named `hasPassed` that takes a double parameter named `gpa` and that returns false if `gpa` was less than `.7` and true otherwise.

```
public static boolean hasPassed(double gpa) {  
    return gpa >= 0.7;  
}
```

4. Write a method that takes a double parameter named `gpa` and that returns a String. You should return "C" if `gpa` is less than 2.5, "B" if `gpa` is between 2.5 and 3.5 and "A" if `gpa` is greater than or equal to 3.5. You should return "invalid" if a `gpa` value less than 0 or greater than 4 is passed in.

```
public static String calcLetterGrade(double gpa) {  
    if(gpa < 0) {  
        return "invalid";  
    } else if(gpa < 2.5) {  
        return "C";  
    } else if(gpa < 3.5) {  
        return "B";  
    } else {  
        return "A";  
    }  
}
```

5. The maximum possible efficiency of a steam engine depends on the temperature of the steam in the boiler and the temperature of the outside air:

$$\text{efficiency} = 1 - T_{\text{air}} / T_{\text{steam}}$$

where T_{air} is the air temperature and T_{steam} is the steam temperature. The temperatures are given in degrees above absolute zero. Normal air temperature is about 300K. Boiling is 373K. Write a method `calcEfficiency` that takes a `Scanner` parameter. The program should ask the user for the air temperature and the steam temperature and print out the maximum possible efficiency of a steam engine. If the steam temperature is less than 373K there is no steam, so the efficiency is zero.

```
public static void calcEfficiency(Scanner console) {
    System.out.print("Air temperature? ");
    double tAir = console.nextDouble();
    System.out.println();
    System.out.print("Stream temperature? ");
    double tStream = console.nextDouble();

    if(tAir < 373) {
        System.out.println(0);
    } else {
        System.out.println(1 - tAir / tStream);
    }
}
```

6. For each call of the method below, write the value that is returned:

```
public static int mystery(int n) {
    if (n < 0) {
        n = n * 3;
        return n;
    } else {
        n = n + 3;
    }
    if (n % 2 == 1) {
        n = n + n % 10;
    }
    return n;
}
```

Call	Value returned
<code>mystery(-5);</code>	-15

mystery(0);	6
mystery(7);	10
mystery(18);	22
mystery(49);	52

7. Write a method `isPalindrome` that returns true if the String parameter is the same read forwards and backwards (ignoring case) and false otherwise. For example:

```
isPalindrome("Hannah") → true
isPalindrome("radar") → true
isPalindrome("Jordan") → false
```

```
public static boolean isPalindrome(String word) {
    word = word.toLowerCase();
    for(int i = 0; i < word.length() / 2; i++) {
        if(word.charAt(i) !=
            word.charAt(word.length() - 1 - i)) {
            return false;
        }
    }
    return true;
}
```

8. Write a method named `pow` that accepts a base and an exponent as parameters and returns the base raised to the given power. Do not use `Math.pow` in your solution. Assume that the base and exponent are non-negative.

```
pow(3, 4) → 81
pow(0, 8) → 0
```

```
public static int pow(int base, int pow) {
    int ans = 1;
    for(int i = 0; i < pow; i++) {
        ans *= base;
    }
    return ans;
}
```