

[**May use all sides of an 8.5 × 11 inch sheet of paper**] Show all of your work clearly in the space provided or on the additional page at the end of the exam. If additional pages are used, clearly identify to which exam question it is related. Be sure to **read each problem carefully**. Note that the exam is double sided. Due to time constraints, you are not required to document your source code.

1. (10 points) What is the **type** and **value** of each of the following expressions?

18 % 5

18 / 5

18 < 5

18.0 – – 5

2. (15 points) Based on the values for the variables below, circle all of the lines of code that will not be executed. All lines of code that would execute should not be circled. For partial credit, be sure to explain your reasoning.

```
int i = 2;
int j = 8;
boolean t = true;
boolean f = false;
```

```
if(i<j)
{
    j = j;
} else {
    i = i;
}
if(i>1 && t!=f)
{
    j = j;
} else {
    if(t==f)
    {
        i = i;
    }
    t = t;
}
```

3. (20 points) Complete the class method called `classify` that accepts a `int` and returns a `String` with one of the following values:

- “negative” — if the value passed to `classify` is less than zero.
- “zero” — if the value passed to `classify` is 0.
- “even” — if the value passed to `classify` is even.
- “odd” — if the value passed to `classify` is odd.

Hints: An integer is even if it is evenly divisible by two. No user input or output is to be done; just write the method described above.

```
private static String classify(int value) {
```

4. (30 points) Write a program to verify or disprove that

$$1^n + 5^n + 10^n + 18^n + 23^n + 27^n = 2^n + 3^n + 13^n + 15^n + 25^n + 26^n$$

for $n = 0, n = 1, n = 2, \dots, n = 9$, and $n = 10$. Be sure to include all that is necessary for the file to compile. Hint: `Math.pow(x, y)` returns x^y where x, y , and the result are all of type `double`.

5. Consider the following code segment:

```
String letters = "";  
int i;  
for(i=0; i<10; ++i) {  
    letters = letters + "a";  
}  
javax.swing.JOptionPane.showMessageDialog(null, letters + i);
```

(a) (10 points) What will be displayed in the JOptionPane pop-up window.

(c) (15 points) Rewrite the code segment using a `while` loop instead of a `for` loop.