Homework 3

(Programming)

Due: 4:00pm, Apr. 22th

1. Fill the following table with good, medium, bad.

	Readability	Implementation efficiency	Execute efficiency
1GL	bad	bad	good
2GL	medium	medium	medium
3GL	good	good	bad

2. Can machine language be run on different computers? Why?

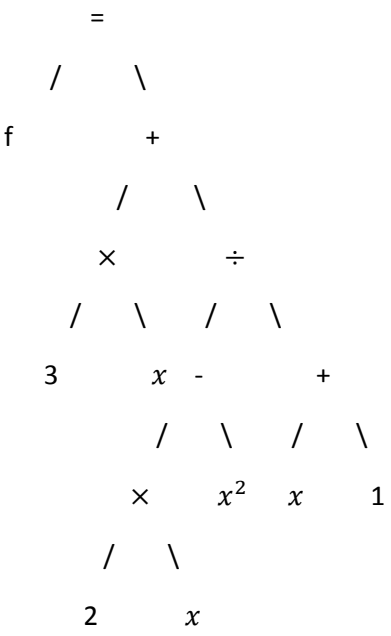
No. It depends on assembly sets.

3. Can Java be run on different computers? Why?

Yes. It is interpreted when running.

4. Draw the parsing tree for

$$f = 3 \times x + \frac{2 \times x - x^2}{x + 1}$$



5. What is the difference between *expression* and *statement*?

Expression returns a value.

Statement does not return a value

6. Finish the following table with expression, statement or both

3+7	expression
a = 2	statement
B = 3 + 7	both
if (x == 3)	both

7. Print the output for the following programs

1)

```
for (i = 1; i < 5; i = i + 2)
{
        print (i);
        print (i+1);
}
```

1, 2, 3, 4

2)

```
i = 5;
while(i > 0)
{
        i = i - 3;
        print (i);
        i = i + 1;
        print (i+1);
}
```

2, 4, 0, 2, -2, 0

3)

```
for (i = 1; i < 6; i++)
{
        if (i >= 3)
                print (i-1);
        else
                print(i);
}
```

1, 2, 2, 3, 4

8. Compute the Big O notation for

1) $n^2 + 2logn$
2) $3nlogn + n + 1$
3) $2^n + n^2$
4) $2n! + n^2$
5) 190
6) $n + 2logn$

Answer:

1) $O(n^2)$
2) $O(nlogn)$
3) $O(2^n)$
4) $O(n!)$
5) $O(1)$
6) $O(n)$

9. What is the time complexity for searching an element from an array? Why?

$O(n)$, we need to scan all the element once to find the desired element.

10. What is the time complexity for searching an element from a **sorted** array? Why?
$O(\log(n))$, we can use binary search.