EXAM SOLUTIONS

CMPSC 24 Winter 2018 Midterm Answer Sheet

Name: DIBA MIRZA Seat no. _____ Perm no. :_____

Student to your left:_____ Student to your right _____

Q1.a [8 pts]: Provide a definition of the `quadratic` class

```
class quadratic {

    public:
        quadratic(double a=0.0, double b=0.0, double c=0.0);
        double evaluate (const double x) const;

friend quadratic operator+ (const quadratic &q1,
                            const quadratic &q2);

    private:
        double ca;
        double cb;
        double cc;

};
```

Q1.b (i) [4 pts]: Implement the constructor of the `quadratic` class

```
quadratic :: quadratic (double a=0.0, double b=0.0, double c=0.0) {

        ca = a;
        cb = b;
        cc = c;

}
```

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Q1.b (ii) (4pts) Implement the `evaluate` function of the `quadratic` class

```
double quadratic:: evaluate (const double x) const {

    return ca* pow(x,2) + cb * x + cc;

}
```

Q1.b(iii) (4pts) Implement the overloaded operator+ of the `quadratic` class

```
quadratic operator + ( const quadratic &q1,
                       const quadratic &q2) {

    quadratic q3 ( q1.ca + q2.ca,
                   q1.cb + q2.cb,
                   q1.cc + q2.cc);

    return q3;
}
```

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Q2.a (6pts)

Variable/ expression in `foo()`	Instance of `quadratic`? **(Yes/No)**	Where is it located in memory? **(Heap/Stack)**	Is the deconstructor of `quadratic` invoked on this object when `foo()` returns? **(Yes/No)**	Does it persist in memory after `foo` returns? **(Yes/No)**
`m`	Yes	Stack	Yes	No
`p`	No	Stack	No	No
`*p`	Yes	Heap	No	Yes

Q2.b (2pts) A **Q2.c(2pts)** A, B, D **Q3 (8pts) a.** B **b. i** A **ii.** B **iii.** C

Q4: a (4pts) (i) $O(N^2)$ **(ii)** $O(2^N)$ **b.(2pts)** Algorithm A

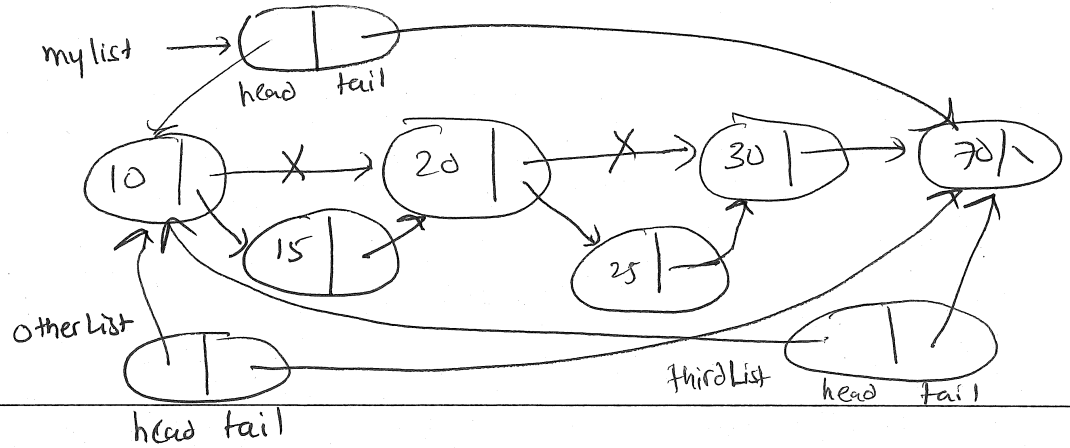
Q5.a (3pts)

O(N)

Q5.b (3pts)

O(N)

Q6.a (10 pts) Draw your pointer diagram here:



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Q6.b (10pts) Implement the overloaded operator+

```
LinkedList operator + (const LinkedList &s1,
                       const LinkedList &s2) {

    LinkedList newList(s1); // using the copy constructor
    Node *tmp = s2.head;
    while (tmp) {
        newList.insert(tmp->data);
        tmp = tmp->next;
    }

    return newList;

}
```