

C++语言作业

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虚函数

头文件:

```
/* Shape.h */
1  #ifndef _SHAPE_H_
2  #define _SHAPE_H_
3
4  class Circle {
5  protected:
6      float radius;
7  public:
8      Circle(float);
9      virtual float area();
10     virtual float volume();
11 };
12
13 class Sphere: Circle {
14 public:
15     Sphere(float);
16     float area();
17     float volume();
18 };
19
20 class Column: Circle {
21 private:
22     float height;
23 public:
24     Column(float, float);
25     float area();
26     float volume();
27 };
28
29 #endif // Shape.h
```

cpp 文件:

```
/* Shape.cpp */
1  #include "Shape.h"
2  #include <cmath>
3
4  Circle::Circle(float radius) {
5      Circle::radius = radius;
6  }
7  float Circle::area() {
8      return M_PI * radius * radius;
9  }
10 float Circle::volume() { return 0; }
11
12 Sphere::Sphere(float radius) : Circle(radius) {}
13 float Sphere::area() {
14     return static_cast<float>(4 * M_PI * radius *
15 radius);
16 }
17 float Sphere::volume() {
18     return static_cast<float>(4 / 3.0 * M_PI *
19 radius * radius * radius);
20 }
21
22 Column::Column(float radius, float height) :
23     Circle(radius) {
24     Column::height = height;
25 }
26 float Column::area() {
27     return static_cast<float>(2 * M_PI * radius *
28 (radius + height));
29 }
30 float Column::volume() {
31     return static_cast<float>(M_PI * radius *
32 radius * height);
33 }
```

教职工

头文件:

```
/* Shape.h */
1  #ifndef _STAFF_H_
2  #define _STAFF_H_
3
4  class Staff {
5  protected:
6      float basicSalary;
7  public:
8      Staff(float);
9      float getBasicSalary() const;
10     void setBasicSalary(float);
11     virtual float salary() const = 0;
12 };
13
14 enum title {
15     PROFESSOR = 50, // 教授
16     ASSOCIATE_PROFESSOR = 30, // 副教授
17     LECTURER = 20 // 讲师
18 };
19 class Teacher: Staff {
20 private:
21     enum title title; // 职位
22     int classHour; // 课时
23 public:
24     Teacher(float, enum title, int);
25     enum title getTitle() const;
26     void setTitle(enum title);
27     int getClassHour() const;
28     void setClassHour(int);
29     float salary() const;
30 };
31
32 class Manager: Staff {
33 private:
34     float postSalary; // 职位工资
```

```

35 public:
36     Manager(float, float);
37     float getPostSalary() const;
38     void setPostSalary(float);
39     float salary() const;
40 };
41
42 class Lab: Staff {
43 private:
44     float dailySubsidy; // 日补贴
45     int workDayPerMonth; // 月工作日数
46 public:
47     Lab(float, float, int);
48     float getDailySubsidy() const;
49     void setDailySubsidy(float);
50     int getWorkDayPerMonth() const;
51     void setWorkDayPerMonth(int);
52     float salary() const;
53 };
54
55 #endif // Staff.h

```

cpp 文件:

```

/* Shape.cpp */
1 #include "Staff.h"
2
3 Staff::Staff(float basicSalary) {
4     Staff::basicSalary = basicSalary;
5 }
6 float Staff::getBasicSalary() const {
7     return basicSalary;
8 }
9 void Staff::setBasicSalary(float basicSalary) {
10     Staff::basicSalary = basicSalary;
11 }

```

```

12
13 Teacher::Teacher(float basicSalary, enum title
    title, int classHour) : Staff(basicSalary) {
14     Teacher::title = title;
15     Teacher::classHour = classHour;
16 }
17 enum title Teacher::getTitle() const {
18     return title;
19 }
20 void Teacher::setTitle(enum title title) {
21     Teacher::title = title;
22 }
23 int Teacher::getClassHour() const {
24     return classHour;
25 }
26 void Teacher::setClassHour(int classHour) {
27     Teacher::classHour = classHour;
28 }
29 float Teacher::salary() const {
30     return basicSalary + title * classHour;
31 }
32
33 Manager::Manager(float basicSalary, float
    postSalary): Staff(basicSalary) {
34     Manager::postSalary = postSalary;
35 }
36 float Manager::getPostSalary() const {
37     return postSalary;
38 }
39 void Manager::setPostSalary(float postSalary) {
40     Manager::postSalary = postSalary;
41 }
42 float Manager::salary() const {
43     return basicSalary + postSalary;
44 }
45
46 Lab::Lab(float basicSalary, float dailySubsidy, int
    workDayPerMonth): Staff(basicSalary) {

```

```

47     Lab::dailySubsidy = dailySubsidy;
48     Lab::workDayPerMonth = workDayPerMonth;
49 }
50 float Lab::getDailySubsidy() const {
51     return dailySubsidy;
52 }
53 void Lab::setDailySubsidy(float dailySubsidy) {
54     Lab::dailySubsidy = dailySubsidy;
55 }
56 int Lab::getWorkDayPerMonth() const {
57     return workDayPerMonth;
58 }
59 void Lab::setWorkDayPerMonth(int workDayPerMonth) {
60     Lab::workDayPerMonth = workDayPerMonth;
61 }
62 float Lab::salary() const {
63     return basicSalary + dailySubsidy *
        workDayPerMonth;
64 }

```

测试代码:

```

/* main.cpp */
1 #include <iostream>
2 #include "Staff.h"
3 using namespace std;
4 int main()
5 {
6     Teacher t(5500, LECTURER, 7);
7     cout << "教师的工资: " << t.salary() << endl;
8     Manager m(5000, 1000);
9     cout << "管理人员的工资: " << m.salary() << endl;
10    Lab l(4000, 60, 20);
11    cout << "实验室人员的工资: " << l.salary() << endl;
12    return 0;
13 }

```