Object Oriented Programming Lab

Lab 12 **Marks 10**

Instructions

Work on this lab individually. You can use your books, notes, handouts etc. but you are not allowed to borrow anything from your peer student. *You are strictly **NOT ALLOWED** to include any additional data-members/functions/constructors* in your class.

Marking Criteria

Show your work to the instructor before leaving the lab to get some or full credit.

What you must do

Program the following task in your C++ compiler and then compile and execute them. *Write the **main** function first and keep testing the functionality of each function once created.*

Ship Inheritance Hierarchy

1. ADT: Ship

Design a **Ship** class that has the following members:

- A member variable for the **name** of the ship (a string)
- A member variable for the **year** that the ship was **built** (a string)
- An appropriate **constructor**
- Appropriate **accessors** and **mutators**
- A **virtual print function** that **displays** the ship's **name** and the **year** it was **built**.

2. ADT: CruiseShip

Design a **CruiseShip** class that is **derived** from the **Ship** class. The **CruiseShip** class should have the following members:

- A member variable for the **maximum number of passengers** (an int)
- An appropriate **constructor**
- Appropriate **accessors** and **mutators**
- A **print function** that **overrides** the **print function** in the **base class**. The **CruiseShip** class's print function should **display** the ship's **name**, **year of built** and the **maximum number of passengers**.

3. ADT: CargoShip

Design a **CargoShip** class that is **derived** from the **Ship** class. The **CargoShip** class should have the following members:

- A member variable for the **cargo capacity** in tonnage (an int).
- An appropriate **constructor**
- Appropriate **accessors** and **mutators**
- A **print function** that **overrides** the **print function** in the **base class**. The **CargoShip** class's print function should **display** only the ship's **name** and the ship's **cargo capacity**.

4. ADT: BattleShip

Design a **BattleShip** class that is **derived** from the **Ship** class. The **BattleShip** class should have the following members:

- A member variable for the **total number of missiles** (an int).
- An appropriate **constructor**
- Appropriate **accessors** and **mutators**
- A **print function** that **overrides** the **print function** in the **base class**. The **BattleShip** class's print function should **display** only the ship's **name** and the **missiles' capacity**.

5. Main Function

In the **main** function, create an array of **4 Ship pointers** and initialize its elements with the addresses of **dynamically allocated objects** of the classes **Ship**, **CruiseShip**, **CargoShip**, and **BattleShip**. Then, **iterate** through the array and call the **print** function of each object to demonstrate the classes. Finally, release any occupied **memory** resources.

☺ ☺ ☺ **BEST OF LUCK** ☺ ☺ ☺