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ITMD 513 Open Source Programming

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Hw11

4-19-19

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'''
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4-15-19
Ship.py
hw11: Polymorphism

This program will contain three classes: Ship, CruiseShip, and CargoShip. The
program will demonstrate the classes with a list of Ships. The list elements
should be initialized with Ship, CruiseShip, and CargoShip objects. The program
should then step through the list, calling each object's print function, and
will use the Python issinstance() function to determine which object type each
element holds.

The Ship class has the following members: a member variable for the name of the
ship, a member variable for the year that the ship was built, a constructor and
appropriate accessors and mutators, and a print function that displays the
ship's name and the year it was built.

The CruiseShip class is derived from the Ship class, and will contain the
following members: a member variable for the maximum number of passengers,
a constructor and appropriate accessors and mutators, and a print function that
overrides the print function in the base class. The CruiseShip class's print
function should display only the ship's name and the maximum number of passengers.
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24
25  The CargoShip class is derived from the Ship class, and will contain the
26  following members: a member variable for the cargo capacity in tonnage,
27  a constructor and appropriate accessors and mutators, and a print function that
28  overrides the print function in the base class. The CargoShip class's print
29  function should display only the ship's name and the ship's cargo capacity.
30
31  Written by Deborah Barndt.
32  '''
33
34  # Class Ship that contains the data for Ship name and the year it was built.
35  class Ship(object):
36      shipName = 'Titanic'
37      shipYear = 1912
38
39      # Function to create a constructor of class Ship.
40      def __init__(self, shipName, shipYear):
41          self.shipName = shipName
42          self.shipYear = shipYear
43
44      # Getter function to get ship name.
45      def getName(self, shipName):
46          return self.shipName
47
48      # Setter function to set the ship name.
49      def setName(self, shipName):
50          self.shipName = shipName
51
52      # Getter function to get the year the ship was built.
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```
53      def getYear(self, shipYear):
54          return self.shipYear
55
56      # Setter function to set the year the ship was built.
57      def setYear(self, shipYear):
58          self.shipYear = shipYear
59
60      # Function to display the name of the ship and the year it was built.
61      def display(self):
62          print('--------------------------------------------------')
63          print("The ship's name is: " + self.shipName)
64          print('The ship was built in: ' + self.shipYear)
65          print('--------------------------------------------------')
66
67  # Class CruiseShip that contains the data for the maximum number of passengers.
68  class CruiseShip(Ship):
69      maxPass = 3000
70
71      # Function to create a constructor of class CruiseShip.
72      def __init__(self, maxPass):
73          self.maxPass = maxPass
74
75      # Getter function to get the maximum passengers.
76      def getMaxPass(self, maxPass):
77          return self.maxPass
78
79      # Setter function to set the maximum passengers.
80      def setMaxPass(self, maxPass):
81          self.maxPass = maxPass
```

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82
83      # Function to display the name of the ship and the maximum passengers.
84      def display(self):
85          print('-------------------------------------------------')
86          print("The ship's name is: " + self.shipName)
87          print('The maximum passengers are:', self.maxPass)
88          print('-------------------------------------------------')
89
90  # Class CargoShip that contains the data for the cargo capacity in tonnage.
91  class CargoShip(Ship):
92      cargoCap = 20000
93
94      # Function to create a constructor of class CargoShip.
95      def __init__(self, cargoCap):
96          self.cargoCap = cargoCap
97
98      # Getter function to get the cargo capacity.
99      def getCargoCap(self, cargoCap):
100         return self.cargoCap
101
102     # Setter function to set the cargo capacity.
103     def setCargoCap(self, cargoCap):
104         self.cargoCap = cargoCap
105
106     # Function to display the name of the ship and the cargo capacity.
107     def display(self):
108         print('-------------------------------------------------')
109         print("The ship's name is: " + self.shipName)
110         print('The cargo capacity of the ship is:', self.cargoCap, 'tons')
```

```
111             print('-------------------------------------------------')
112
113     # Function to run the program for the ship, cruiseship, and cargoship classes.
114     def main():
115         # Function to display the ship list.
116         def showShips(ship):
117             if isinstance(ship, CargoShip):
118                 print('-------------------------------------------------')
119                 print('             This is a cargo ship.')
120                 ship.setName('Royal Caribbean')
121                 ship.setCargoCap(100000)
122                 ship.display()
123
124             elif isinstance(ship, CruiseShip):
125                 print('-------------------------------------------------')
126                 print('             This is a cruise ship.')
127                 ship.setName('Carnival')
128                 ship.setYear('2011')
129                 ship.display()
130
131             else:
132                 print('-------------------------------------------------')
133                 print('               This is a ship.')
134                 ship.display()
135
136             ships = ['ship', 'cruiseship', 'cargoship']
137
138         vessel = Ship('Titanic', '1912')
139         cruise = CruiseShip(4000)
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140         cargo = CargoShip(50000)
141
142         ships = [vessel, cruise, cargo]
143
144         for ship in ships:
145             showShips(ship)
146
147
148     '''    # Driver code for test 1.
149         ships = ['ship', 'cruiseship', 'cargoship']
150
151         ships[0] = Ship('Titanic', '1912')
152         ships[0].setName('Carnival')
153         ships[0].setYear('2011')
154
155         ships[1] = CruiseShip(3000)
156         ships[1].setName('Carnival')
157         ships[1].setMaxPass(4000)
158
159         ships[2] = CargoShip(20000)
160         ships[2].setName('Carnival')
161         ships[2].setCargoCap(50000)
162
163         # Call the display methods using the values in the list.
164         for x in ships:
165             x.display()
166
167         # Driver code for test 2.
168         ships = ['ship', 'cruiseship', 'cargoship']
```

```
169
170         ships[0] = Ship('Titanic', '1912')
171         ships[0].setName('Royal Caribbean')
172         ships[0].setYear('2001')
173
174         ships[1] = CruiseShip(3000)
175         ships[1].setName('Royal Caribbean')
176         ships[1].setMaxPass(4000)
177
178         ships[2] = CargoShip(20000)
179         ships[2].setName('Royal Caribbean')
180         ships[2].setCargoCap(100000)
181
182         # Call the display methods using the values in the list.
183         for x in ships:
184             x.display()
185
186         # Driver code for test 3.
187         ships = ['ship', 'cruiseship', 'cargoship']
188
189         ships[0] = Ship('Titanic', '1912')
190         ships[0].setName('Norwegian Getaway')
191         ships[0].setYear('2014')
192
193         ships[1] = CruiseShip(3000)
194         ships[1].setName('Norwegian Getaway')
195         ships[1].setMaxPass(3900)
196
197         ships[2] = CargoShip(20000)
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198         ships[2].setName('Norwegian Getaway')
199         ships[2].setCargoCap(146000)
200
201         # Call the display methods using the values in the list.
202         for x in ships:
203             x.display()
204
205         # Driver code for test 4.
206         ships = ['ship', 'cruiseship', 'cargoship']
207
208         ships[0] = Ship('Titanic', '1912')
209         ships[0].setName('Majestic Princess')
210         ships[0].setYear('2017')
211
212         ships[1] = CruiseShip(3000)
213         ships[1].setName('Majestic Princess')
214         ships[1].setMaxPass(4300)
215
216         ships[2] = CargoShip(20000)
217         ships[2].setName('Majestic Princess')
218         ships[2].setCargoCap(145000)
219
220         # Call the display methods using the values in the list.
221         for x in ships:
222             x.display()
223
224     def showShips(vessel):
225         if isinstance(vessel, boats.Ship):
226             vessel.display()
```

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227
228         else:
229             print('That is not a ship. Please try again.')
230     '''
231     # Call the main function to begin the program.
232     main()
233
234     Output Result:
```
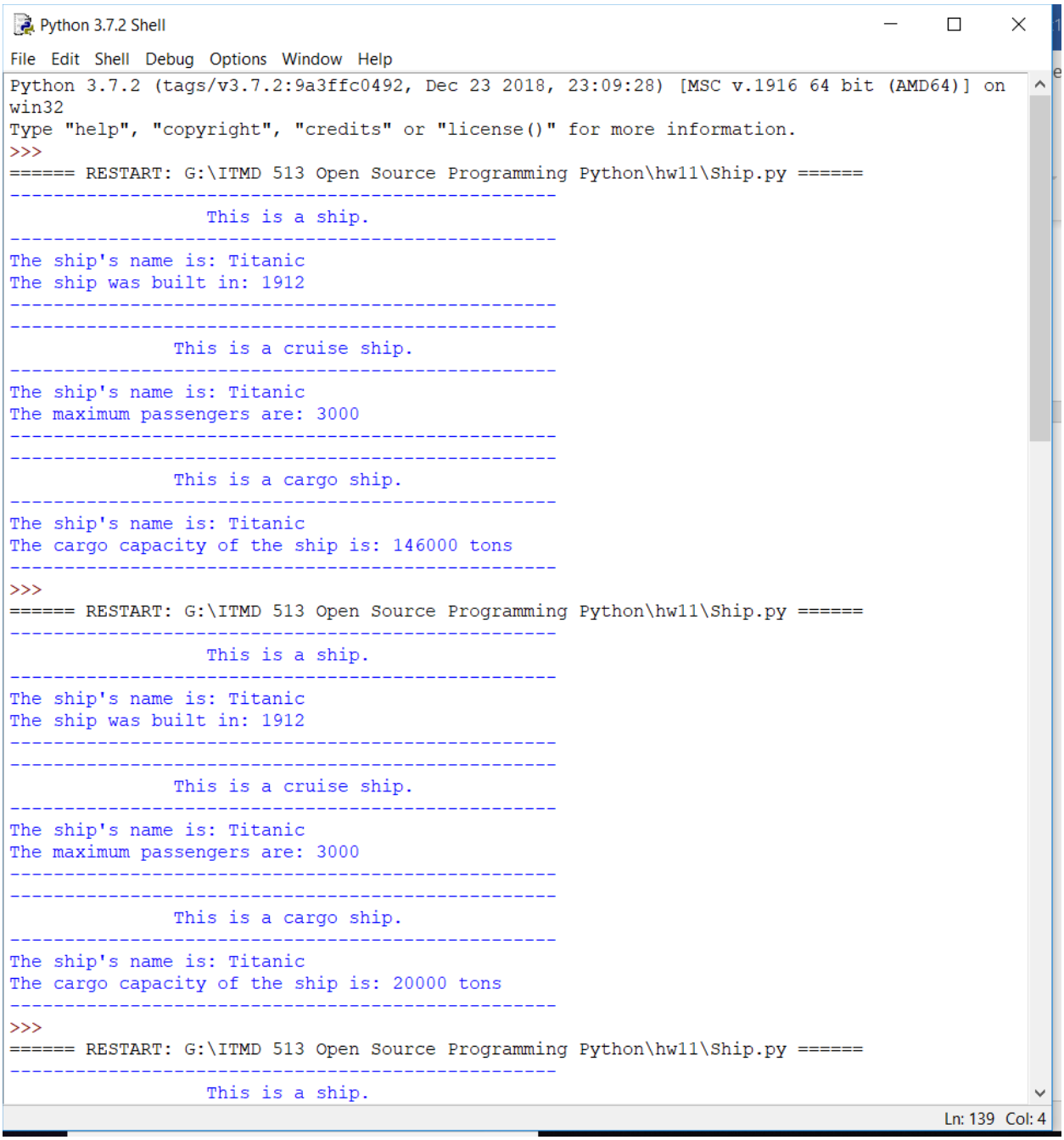
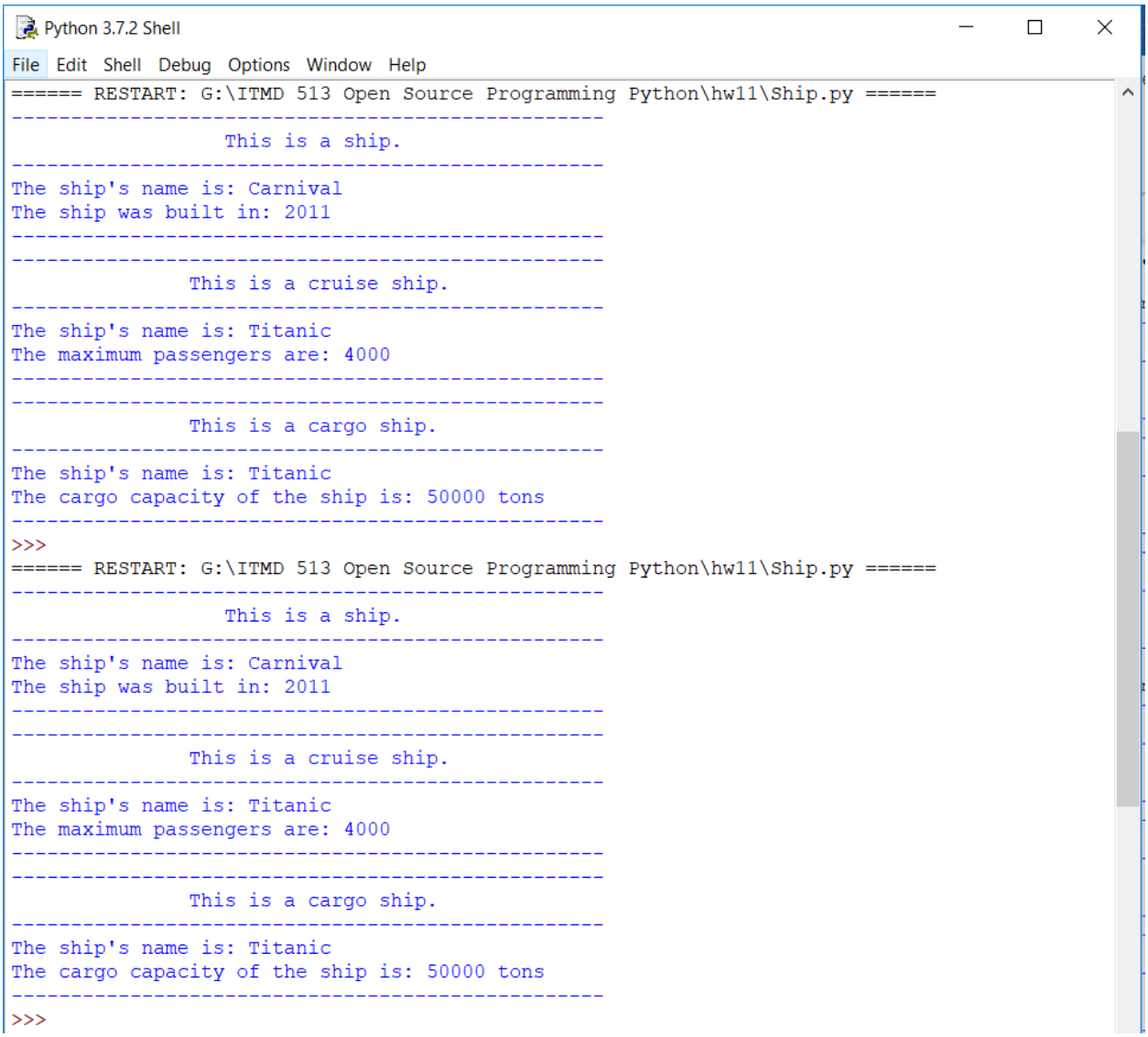


Python 3.7.2 Shell
File Edit Shell Debug Options Window Help
Python 3.7.2 (tags/v3.7.2:9a3ffc0492, Dec 23 2018, 23:09:28) [MSC v.1916 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
====== RESTART: G:\ITMD 513 Open Source Programming Python\hw11\Ship.py ======
This is a ship.
The ship's name is: Titanic
The ship was built in: 1912
This is a cruise ship.
The ship's name is: Titanic
The maximum passengers are: 3000
This is a cargo ship.
The ship's name is: Titanic
The cargo capacity of the ship is: 146000 tons
>>>
====== RESTART: G:\ITMD 513 Open Source Programming Python\hw11\Ship.py ======
This is a ship.
The ship's name is: Titanic
The ship was built in: 1912
This is a cruise ship.
The ship's name is: Titanic
The maximum passengers are: 3000
This is a cargo ship.
The ship's name is: Titanic
The cargo capacity of the ship is: 20000 tons
>>>
====== RESTART: G:\ITMD 513 Open Source Programming Python\hw11\Ship.py ======
This is a ship.
Ln: 139 Col: 4


Python 3.7.2 Shell
File Edit Shell Debug Options Window Help
====== RESTART: G:\ITMD 513 Open Source Programming Python\hw11\Ship.py ======
This is a ship.
The ship's name is: Carnival
The ship was built in: 2011
This is a cruise ship.
The ship's name is: Titanic
The maximum passengers are: 4000
This is a cargo ship.
The ship's name is: Titanic
The cargo capacity of the ship is: 50000 tons
>>>
====== RESTART: G:\ITMD 513 Open Source Programming Python\hw11\Ship.py ======
This is a ship.
The ship's name is: Carnival
The ship was built in: 2011
This is a cruise ship.
The ship's name is: Titanic
The maximum passengers are: 4000
This is a cargo ship.
The ship's name is: Titanic
The cargo capacity of the ship is: 50000 tons
>>>

```
====== RESTART: G:\ITMD 513 Open Source Programming Python\hw11\Ship.py ======
--------------------------------------------------
                  This is a ship.
--------------------------------------------------
The ship's name is: Titanic
The ship was built in: 1912
--------------------------------------------------
--------------------------------------------------
               This is a cruise ship.
--------------------------------------------------
The ship's name is: Carnival
The maximum passengers are: 4000
--------------------------------------------------
--------------------------------------------------
               This is a cargo ship.
--------------------------------------------------
The ship's name is: Titanic
The cargo capacity of the ship is: 50000 tons
--------------------------------------------------
>>>
====== RESTART: G:\ITMD 513 Open Source Programming Python\hw11\Ship.py ======
--------------------------------------------------
                  This is a ship.
--------------------------------------------------
The ship's name is: Titanic
The ship was built in: 1912
--------------------------------------------------
--------------------------------------------------
               This is a cruise ship.
--------------------------------------------------
The ship's name is: Carnival
The maximum passengers are: 4000
--------------------------------------------------
--------------------------------------------------
               This is a cargo ship.
--------------------------------------------------
The ship's name is: Royal Caribbean
The cargo capacity of the ship is: 100000 tons
--------------------------------------------------
>>>
```