**Assignment #6: Inheritance, Polymorphism, and Dynamic Dispatch**

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Here are some partial class definitions (unimportant code has been omitted):

**public class Home {**

**public void motto() { System.out.println("Home sweet home!"); }**

**}  
  
public class Condominium extends Home {**

**public void monthlyFee() { System.out.println("Covers water, sewer & trash"); }**  
**public void motto() { System.out.println("Can't we all just get along?"); }**

**}  
  
public class ResortCondo extends Condominium {**

**public void monthlyFee() { System.out.println("Covers utilities, gym & pool"); }  
public void hasSwimmingPool() { System.out.println("true"); }**

**}**

Assume that these statements have already executed:

**Home h = new Home();  
Condominium c = new Condominium();  
ResortCondo r = new ResortCondo();  
  
Object oh = h;  
Home hc = c;  
Home hr = r;**  
**// Add new statements here ONE AT A TIME (for Parts 2 and 3 below)**

1. Every reference variable has a static type and a dynamic type, which might be the same or might be different. What are the **static** and **dynamic types** for each of these variables?

**oh** // Answer: static type: Object dynamic type: Home

**hc** // Answer: static type: Home dynamic type: Condominium

**hr** // Answer: static type: Home dynamic type: ResortCondo

2) Explain what would happen if each of the following statements were inserted ONE AT A TIME in the spot marked above. Answer the following questions for each statement:

1. **Would the statement cause a syntax error?**
2. **If not, would the statement cause a ClassCastException?**
3. **If not, what are the static and dynamic types of the variable declared?**

**Home hx = hc;** // Answer:

no syntax error, doesn’t cause a ClassCastException

static type: Home dynamic type: Condominium

**Home hx = oh;** // Answer:

syntax error because the static type of oh (Object) doesn’t conform to

the static type of hx (Home)

**Home hx = (Home)oh;** // Answer:

no syntax error, doesn’t cause a ClassCastException

static type: Home dynamic type: Home

**Home hx = hr;** // Answer:

no syntax error, doesn’t cause a ClassCastException

static type: Home dynamic type: ResortCondo

**Condominium cx = (Condominium)hr;** // Answer:

no syntax error, doesn’t cause a ClassCastException

static type: Condominium dynamic type: ResortCondo

**ResortCondo rx = (ResortCondo)hc;** // Answer:

no syntax error, but causes a ClassCastException because

the dynamic type of hc (Condominium) doesn’t conform to ResortCondo

3) Finally, explain what would happen if each of the following statements were inserted ONE AT A TIME in the spot marked above. Answer the following questions for each statement:

1. **Would the statement cause a syntax error?**
2. **If not, would the statement cause a ClassCastException?**
3. **If not, then explain what output is shown on the console.**

**hc.motto();**// Answer:

no syntax error, doesn’t cause a ClassCastException

output: Can't we all just get along?

**oh.motto();**// Answer:

syntax error because the static type of oh (Object) doesn’t have a motto() method

**r.motto();**// Answer:

no syntax error, doesn’t cause a ClassCastException

output: Can't we all just get along?

**((ResortCondo)hc).hasSwimmingPool();** // Answer:

no syntax error, but causes a ClassCastException because

the dynamic type of hc (Condominium) doesn’t conform to ResortCondo

**((ResortCondo)hr).hasSwimmingPool();** // Answer:

no syntax error, doesn’t cause a ClassCastException

output: true