CS 3723: Programming Languages
Apr 16, 2012

You Name:

1. Which of the following is *NOT* a required property of an object-oriented abstraction?
   (a) is a data type
   (b) support encapsulation (is a module)
   (c) support subtype polymorphism
   (d) support implementation inheritance
   (e) is the subtype of an universal base type such as the *object* class in Java
   (f) support dynamic binding of member functions

2. Given the ML code,

```
fun mk_vehicle () =
let val speed = ref 0.0; val fuel = ref 0.0
in let fun start(x) = speed := x; fun refuel (x) = fuel := !fuel + x
   in { public_start = start } end
end;
```

   which of the following is an equivalent C++ translation?

   (a)
```
class vehicle { private: double speed, fuel;
                  public:
                    vehicle() { speed = 0.0; fuel = 0.0; }
                    virtual void start(double x) {speed = x;}
                    virtual void refuel(double x) { fuel = fuel + x; }
                };
```

   (b)
```
class vehicle { private: double speed, fuel;
                    virtual void refuel(double x) { fuel = fuel + x; }
                  public:
                    vehicle() { speed = 0.0; fuel = 0.0; }
                    virtual void start(double x) {speed = x;}
                };
```

   (c)
```
class vehicle { private: double speed, fuel;
                    virtual void refuel(double x) { fuel = fuel + x; }
                  public:
                    vehicle() { speed = 0.0; fuel = 0.0; }
                    virtual void public_start(double x) {speed = x;}
                };
```