QUIZ #2

1. (0.5 points) A **stack** is a sequence in which items are added or removed from only one end, called the **top** of the stack. You can envision it as a physical stack of dinner plates; you can either add a plate to the top of the stack (known as a **push** operation), or you can remove the top-most plate (known as a **pop** operation).

   A **stack machine** is a machine that has an internal stack and uses it to perform computations. Your task is to implement a **post-fix calculator**, a type of stack machine. Define a class PFCalc. It should accept the following messages:

   ```
   (ask pfc 'push number)     pushes number onto the top of the stack
   (ask pfc 'add)             pops two numbers off the stack and adds them. The result is returned and pushed
                              onto the stack.
   ```

   For example:

   ```
   (define pfc (instantiate PFCalc))
   (ask pfc 'push 5)
   (ask pfc 'push 10)
   (ask pfc 'push 20)
   (ask pfc 'add)
   30
   (ask pfc 'add)
   35
   ```

   Assume that you already have a class Stack. It does not have any instantiation arguments. It accepts the following messages:

   ```
   (ask st 'empty?)      returns #t if there are no items in the stack, #f otherwise
   (ask st 'push item)   pushes item onto the top of the stack
   (ask st 'pop)         returns the top-most item and removes it from the stack
   ```

   (By the way, post-fix calculators are far better than in-fix ones. Those of you who have yet to realize the beauty and merits of post-fix entry are free to debate this with me after class or during my office hours.)

2. (0.5 points) In which of the following cases should one class be the parent of the other class? In such cases, draw an arrow from the **child to the parent**. In other words, A → B means that A should be a child of B. If one class should not be the parent of the other, then do not draw anything.

Stack	Stack Machine
Professor	TA
Computer	Keyboard
Web Page	Web Server
Automobile	Wheel
Musician	Drummer
Road	Freeway

For each of the following, which should be used: a **class** variable or an **instance** variable?

- In a file cabinet class, the number of files in the file cabinet   _____

- In an AC Transit local bus class, the price of a bus ticket   _____