Name:	
(as it would appear on official course roster)	

Umail address:	@umail.ucsb.edu	section
Optional: name you wish to be called if different from name above.		
Optional: name of "homework buddy" (leaving this blank signifies "I worked alone"		

1

h01

CS24 F19

h01: Chapter 1.1, 2.1-2.2

ready?	assigned	due	points
true	Thu 09/26 12:00AM	Wed 10/02 11:59PM	100

You may collaborate on this homework with AT MOST one person, an optional "homework buddy".

INSTEAD OF TURNING IN THIS HOMEWORK, YOU WILL TAKE A QUIZ ON GAUCHOSPACE BY THE DUE DATE.
There is NO MAKEUP for missed homework assignments.
The quiz will be made available at least two days before the due date.

Reading: Read Chapter 1.1, 2.1-2.2. If you don't have a copy of the textbook yet, there is one on reserve at the library under "COMP000-STAFF - Permanent Reserve".

1. (5 pts) Name two benefits of procedural abstraction in writing code.

   - You can reuse code without having to copy/paste it
   - It simplifies the process of solving large problems—you can break a large problem down into smaller functions first, and then worry about translating each of those to lines of code
   - Irrelevant details are hidden away

2. (5 pts) Describe a technique for incorporating the principle of information hiding when describing a function's behaviour.

   Pre-/postconditions! They allow you to specify what needs to be true before a function is called and what will be true after a function is called, and that is enough for a user to understand exactly what a function does and how to use it. There is no need to mention the exact algorithm used.

3. (10 pts) Write the pre and post conditions for a function that takes as input two parameters: distance (in meters) and time (in seconds), and computes speed as output.

   Precondition: distance is a length in meters (and thus non-negative), and time is a length of time in seconds

   Postcondition: the return value is the speed (in m/s) for traveling the given distance in the given time

4. (5 pts) Which access specifier should be used to hide member functions and variables from code outside of the class?

   private

5. (5 pts) What is the difference between a class and an object?

   A class is the declaration of a type, and an object is an element of that type. An object is to a class like 0 is to int.

6. (10 pts) Modify the definition of the throttle class on page 35, to create a new throttle ADT, which allows the user of the ADT to specify the number of shift levels when creating objects of that class. You don't need to provide an implementation of the new throttle ADT, just the class definition.

```
class throttle
{
public:
   throttle(int shiftlevels)
   // MODIFICATION MEMBER FUNCTIONS void shut_off( );
   void shift(int amount);
   // CONSTANT MEMBER FUNCTIONS double flow( ) const;
   bool is_on() const;
private:
   int position;
   int shiftlevels;
};
```

2

h01

CS24 F19

7. (10 pts) Modify the definition of the throttle ADT on page 35, to create a new throttle ADT, which models a throttle as having a lever to control the flow of fuel (as before), and a light that indicates if the fuel flow is above or below a threshold. The light is green if the fuel flow is below 70%, and red otherwise. The new throttle ADT should have appropriate member functions to check on the status of the light. Implement the new throttle ADT

```
class throttle
{
public:
   // CONSTRUCTORS
   throttle();
   throttle(int size);
   // MODIFICATION MEMBER FUNCTIONS
   void shut_off( ) { position = 0; }
   void shift(int amount);
   // CONSTANT MEMBER FUNCTIONS
   double flow() const;
   bool is_on() const;
   bool light_is_green() const;
private:
   int top_position;
   int position;
};

bool throttle::light_is_green() const {
   return flow() <= 0.70;
}

// see the book for the rest of the implementation
```

8. (50 pts) Complete the CS 16 final exam available at this link. If you feel like printing it out, you may also use the following answer sheet.

Answers are here: https://docs.google.com/document/d/1AsJR45vqnRHzSrPrnp9ck7dLg3NLZt6H_ys5gDm-zTA/edit