# SAVITCH ABSOLUTE C++

# Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Term # \_\_\_\_

**Homework 12 - On Lecture 15 – Polymorphism**

**(100 points) Hours:**

**The homework is to be turned in as a *PAPER AND PENCIL i.e., HANDWRITTEN ANSWER ONLY!(with your terminal #!)* in the first ten minutes of the due date class.**

**Also an implementation in Visual Studio is ALSO required, thus you are to submit the ZIPPED project to BB and download it in 232 PGH the first 10 minutes of class. Hardcopy with screenshots of the running program and the SOURCE CODE are also needed.**

**TURNING IN THE HOMEWORK INSTRUCTIONS will be PENALTY OF -10 points.**

**I UNDERSTAND THAT TURNING ANOTHER’s WORK IN is CHEATING.**

**I UNDERSTAND THAT ANY KIND OF DISSEMINATION of this WORK is CHEATING.**

**I CERTIFY THAT THE HOMEWORKs SOLUTIONs ARE MY OWN WORK!**

**?**

**X**

**V**

**SIGNATURE:**

**TA check, is Homework12.doc & Homework12.zip**

**in BB?**

**HOMEWORK CHECKLIST (YOU MUST GRADE YOURSELF!):**

1. **DID TURN IN HOMEWORK INSTRUCTIONS? \* -10 points**
2. **1.? H & E (attach to BB) – WORD ONLY 40 points**
3. **2.? 60 points**
4. **Homework12 C++.zip NOT submitted to BB? \* -55 points**
5. **Homework12 C++.zip NOT running in class? \* -55 points**

**\* If NOT, do not enter anything in the box!**

TA **grade or check**

**PLEASE ENTER YOUR GRADE IN THIS BOX:**

**By Hand?**

# I understand that if the .zip file is NOT in BB and I did not check the BOX, I will get a ZERO for the Homework!

**Screenshot?**

**1.** (35 pts)(**BY HAND**):

a. (5 pts)Explain the difference among the terms virtual function, late binding, and polymorphism.

**ANSWER:**

b. (5 pts Suppose you modify the definitions of the class Sale ( Display 15.1) by deleting the reserved word virtual. How would that change the output of the program in Display 15.5?

**ANSWER:**

c. (5 pts)s it legal to have an abstract class in which all member functions are pure virtual functions?

**ANSWER:**

d. (5 pts)Given the definition of the class Employee in Display 15.6, which of the following are legal?

A.

Employee joe;

joe = Employee( );

B.

class HourlyEmployee : public Employee

{

public:

HourlyEmployee( );

< Some more legal member function definitions, none of which

are pure virtual functions.>

private:

double wageRate;

double hours;

};

int main( )

{

Employee joe;

joe = HourlyEmployee( );

C.

bool isBossOf( const Employee& e1, const Employee& e2);

**ANSWER:**

e. (5 pts)Why can’t you assign a base class object to a derived class variable?

**ANSWER:**

f. (5 pts)What is the problem with the ( legal) assignment of a derived class object to a base class variable?

**ANSWER:**

g. (5 pts)Suppose the base class and the derived class each has a member function with the same signature. When you have a base class pointer to a derived class object and call a function member through the pointer, discuss what determines which function is actually called, the base class member function or the derived class member function.

**ANSWER:**

**2.** (65 pts) **UML Class Diagram** (**MICROSOFT WORD; Textual Analysis – TA Cut&Paste&Rearrange**).

Listed below is code to play a guessing game in which two players attempt to guess a number. Your task is to extend the program with objects that represent either a human player or a computer player.

bool checkForWin( int guess, int answer)

{

if ( answer == guess)

{

cout << " You're right! You win!" << endl;

return true;

}

else if ( answer < guess)

cout << " Your guess is too high." << endl;

else

cout << " Your guess is too low." << endl;

return false;

}

void play( Player & player1, Player & player2)

{

int answer = 0, guess = 0;

answer = rand() % 100;

bool win = false;

while (! win)

{

cout << " Player 1' s turn to guess." << endl;

guess = player1. getGuess();

win = checkForWin( guess, answer);

if ( win) return;

cout << " Player 2' s turn to guess." << endl;

guess = player2. getGuess();

win = checkForWin( guess, answer);

}

}

The play function takes as input two Player objects. Define the Player Class with a **virtual** function named getGuess(). The implementation of Player:: getGuess() can simply return 0. Next, define a Class named HumanPlayer derived from Player. The implementation of HumanPlayer:: getGuess() should prompt the user to enter a number and return the value entered from the keyboard. Next, define a Class named ComputerPlayer derived from Player. The implementation of ComputerPlayer:: getGuess() should randomly select a number from 0 to 100. Finally, construct a main function that invokes play(Player & player1, Player & player2) with two instances of a HumanPlayer (human versus human), an instance of a HumanPlayer and ComputerPlayer (human versus computer), and two instances of ComputerPlayer (computer versus computer).

1. (10 pts) **OOA & OOD: Draw the UML Class Diagram.**

**ANSWER:**

1. (55 pts) **Implementation: Visual Studio 2010 AS HOMEWORK12 build and run, Source Code and Screenshot. Submit zipped project to BB!**

[**http://media.pearsoncmg.com/aw/aw\_savitch\_abc\_4/videos/video15\_1/video.html**](http://media.pearsoncmg.com/aw/aw_savitch_abc_4/videos/video15_1/video.html)

**ANSWER:**



