Using Pseudocode to write Real Python Code

Consider this pseudocode program:

```
// Program example
// Description:
//     calculates gross pay from hours worked and pay rate
//      formula used:  gross pay = pay rate * hours worked
// Author: Carl Gregory
// Date: 12 February 2015
// Revised:

// main program

   // Declare variables
   decimal   hours
   real payRate, grossPay

   // get work time and wage
   Display "How many hours did you work? "
   Read hours
   Display "What is your pay rate?  $"
   Input payRate

   // calculate and display the gross pay
   grossPay = hours * payRate
   Display  "In ", hours, " hours you made:  $", grossPay

// end program
```

To write it in Python syntax, first paste it into IDLE

```
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   // calculate and display the gross pay
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// end program
```

Next, convert all lines to Python Comments using the "Comment Out" feature

```
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##// main program
##
##    // Declare variables
##    decimal   hours
##    real payRate, grossPay
##
##    // get work time and wage
##    Display "How many hours did you work? "
##    Read hours
##    Display "What is your pay rate?  $"
##    Input payRate
##
##    // calculate and display the gross pay
##    grossPay = hours * payRate
##    Display  "In ", hours, " hours you made:  $", grossPay
##
##// end program
```

Then write Python equivalent statements beneath every pseudocode statement

```
##// Program example
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##//     formula used:  gross pay = pay rate * hours worked
##// Author: Carl Gregory
##// Date: 12 February 2015
##// Revised:
##
##// main program
def main():
##
##   // Declare variables
##   decimal   hours
##   real payRate, grossPay
        hours = 0.0
        payRate = 0.0
        grossPay = 0.0
##
##   // get work time and wage
##   Display "How many hours did you work? "
##   Read hours
        hours = float(input("How many hours did you work? "))
##   Display "What is your pay rate?  $"
##   Input payRate
        payRate = float(input("What is your pay rate?  $"))
##
##   // calculate and display the gross pay
##   grossPay = hours * payRate
        grossPay = hours * payRate
##   Display  "In ", hours, " hours you made:  $", grossPay
        print("In ", hours, " hours you made:  $", grossPay)
##
##// end program
main()
```

The "declarations" are not required in Python, but every other language will need them, so the pseudocode needs them, so it's good form to have "equivalent" statements in Python also

```
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##// Date: 12 February 2015
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##
##// main program
def main():
##
##   // Declare variables
##   decimal   hours
##   real payRate, grossPay
        hours = 0.0
        payRate = 0.0
        grossPay = 0.0
##
##   // get work time and wage
##   Display "How many hours did you work? "
##   Read hours
        hours = float(input("How many hours did you work? "))
##   Display "What is your pay rate?  $"
##   Input payRate
        payRate = float(input("What is your pay rate?  $"))
##
##   // calculate and display the gross pay
##   grossPay = hours * payRate
        grossPay = hours * payRate
##   Display  "In ", hours, " hours you made:  $", grossPay
        print("In ", hours, " hours you made:  $", grossPay)
##
##// end program
main()
```

Since Python has no "typed" variables it inputs everything as strings, so if the input variable is numeric, the input must be converted

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##// Revised:
##
##// main program
def main():
##
##   // Declare variables
##   decimal   hours
##   real payRate, grossPay
        hours = 0.0
        payRate = 0.0
        grossPay = 0.0
##
##   // get work time and wage
##   Display "How many hours did you work? "
##   Read hours
        hours = float(input("How many hours did you work? "))
##   Display "What is your pay rate?  $"
##   Input payRate
        payRate = float(input("What is your pay rate?  $"))
##
##   // calculate and display the gross pay
##   grossPay = hours * payRate
        grossPay = hours * payRate
##   Display  "In ", hours, " hours you made:  $", grossPay
        print("In ", hours, " hours you made:  $", grossPay)
##
##// end program
main()
```

Run and Test the program before completely cleaning out the old pseudocode statements

```
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##// Date: 12 February 2015
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##
##// main program
def main():
##
##   // Declare variables
##   decimal   hours
##   real payRate, grossPay
        hours = 0.0
        payRate = 0.0
        grossPay = 0.0
##
##   // get work time and wage
##   Display "How many hours did you work? "
##   Read hours
        hours = float(input("How many hours did you work? "))
##   Display "What is your pay rate?  $"
##   Input payRate
        payRate = float(input("What is your pay rate?  $"))
##
##   // calculate and display the gross pay
##   grossPay = hours * payRate
        grossPay = hours * payRate
##   Display  "In ", hours, " hours you made:  $", grossPay
        print("In ", hours, " hours you made:  $", grossPay)
##
##// end program
main()
```

Now remove the pseudocode statements

```
##// Program example
##// Description:
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##//     formula used:  gross pay = pay rate * hours worked
##// Author: Carl Gregory
##// Date: 12 February 2015
##// Revised:
##
##// main program
def main():
##
##    // Declare variables
##    decimal   hours
##    real payRate, grossPay
        hours = 0.0
        payRate = 0.0
        grossPay = 0.0
##
##    // get work time and wage
##    Display "How many hours did you work? "
##    Read hours
        hours = float(input("How many hours did you work? "))
##    Display "What is your pay rate?  $"
##    Input payRate
        payRate = float(input("What is your pay rate?  $"))
##
##    // calculate and display the gross pay
##    grossPay = hours * payRate
        grossPay = hours * payRate
##    Display  "In ", hours, " hours you made:  $", grossPay
        print("In ", hours, " hours you made:  $", grossPay)
##
##// end program
main()
```

This still leaves some distracting clutter, so…

```
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##//     formula used:  gross pay = pay rate * hours worked
##// Author: Carl Gregory
##// Date: 12 February 2015
##// Revised:
##
def main():
##
##   // Declare variables
       hours = 0.0
       payRate = 0.0
       grossPay = 0.0
##
##   // get work time and wage
       hours = float(input("How many hours did you work? "))
       payRate = float(input("What is your pay rate?  $"))
##
##   // calculate and display the gross pay
       grossPay = hours * payRate
       print("In ", hours, " hours you made:  $", grossPay)
##
##// end program
main()
```

Finally, clean up the Python code

```
# Program example
# Description:
#     calculates gross pay from hours worked and pay rate
#      formula used:  gross pay = pay rate * hours worked
# Author: Carl Gregory
# Date: 12 February 2015
# Revised:

def main():

        # Declare variables
        hours = 0.0
        payRate = 0.0
        grossPay = 0.0

        # get work time and wage
        hours = float(input("How many hours did you work? "))
        payRate = float(input("What is your pay rate?  $"))

        # calculate and display the gross pay
        grossPay = hours * payRate
        print("In ", hours, " hours you made:  $", grossPay)

# end program
main()
```

- Notice that many of the pseudocode comments ended up as comments in the Python code also
- Also notice that the header file did not change
  - It might have changed if the revision had happened on a later date, or if the program name or the author changed – but that's the purpose of the header, to supply that information

Why pseudocode works:
exactly the same pseudocode with equivalent C++ statements

```
//// Program example
//// Description:
//// calculates gross pay from hours worked and pay rate
//// formula used:  gross pay = pay rate * hours worked
//// Author: Carl Gregory
//// Date: 12 February 2015
//// Revised:
//
//// main program
main()
{
//
//   // Declare variables
//   decimal   hours
            float hours;
//   real payRate, grossPay
            float payRate, grossPay;
//
//   // get work time and wage
//   Display "How many hours did you work? "
            cout << "How many hours did you work? ";
//   Read hours
            cin >> hours;
//   Display "What is your pay rate?  $"
            cout << "What is your pay rate? $";
//   Input payRate
            cin >> payRate;
//
//   // calculate and display the gross pay
//  grossPay = hours * payRate
            grossPay = hours * payRate;
//   Display  "In ", hours, " hours you made:  $", grossPay
            cout << "In " << hours << " hours you made:  $" << grossPay << endl;
//
//// end program
} // main program
```

Why pseudocode works:
exactly the same pseudocode with equivalent C++ statements

```
// Program example
// Description:
//     calculates gross pay from hours worked and pay rate
//      formula used:  gross pay = pay rate * hours worked
// Author: Carl Gregory
// Date: 12 February 2015
// Revised:

// main program
main()
{

        // Declare variables
        float hours;
        float payRate, grossPay;

        // get work time and wage
        cout << "How many hours did you work? ";
        cin >> hours;
        cout << "What is your pay rate? $";
        cin >> payRate;

        // calculate and display the gross pay
        grossPay = hours * payRate;
        cout << "In " << hours << " hours you made:  $" << grossPay << endl;

} // main program
```

- Notice that C++ needed the declaration statements to be in the pseudocode
- Also notice that C++ needs separate prompt and input commands to be in the pseudocode
- Also notice that C++ does not need to convert the input since it knows that the input is being assigned to a numeric variable

FIN