

Algorithms

Software Development Method

1. Specify the problem requirements
2. Analyze the problem
3. Design the *algorithm* to solve the problem
4. Implement the algorithm
5. Test and verify the completed program
6. Maintain and update the program

Software Development Method

1. Specify the problem requirements
 - In this class, often done for you
2. Analyze the problem
 - Your job – what are the inputs and outputs
3. Design the *algorithm* to solve the problem
 - Your job – write it down and turn it in!
4. Implement the algorithm
 - Your job
5. Test and verify the completed program
 - Your job – this is the most time consuming part
 - Go back to step 4 if your program fails the tests
6. Maintain and update the program
 - Always assume you will reuse your code at some point

Algorithms

- Step-by-step procedure for solving a problem
- Be as specific as possible – include all steps

- Example – doing your laundry

Calculate Tax on an Item

- Problem
- Analysis
- Algorithm design
- Implementation
- Testing
- Maintenance

```
#A program to calculate tax and total cost for an item.  
  
#determine rate of taxation  
  
#ask user for the cost of the item  
  
#calculate the tax  
  
#calculate total cost  
  
#display the results
```

```

#Name: Sami Rollins
#A program to calculate tax and total cost for an item.

#determine rate of taxation
TAX_RATE = .0825

#ask user for the cost of the item
cost = input("Enter item cost: ")

#calculate the tax
tax = cost*TAX_RATE

#calculate total cost
total = cost+tax

#display the results
print "Cost: ", cost
print "Tax : ", tax
print "Total: ", total

```

Heading

```

#Name: Sami Rollins
#A program to calculate tax and total cost for an item.

```

- Indicates what the program does
- Comments
 - # to the end of the line

Variables

```

#determine rate of taxation
TAX_RATE = .0825

```

- Sets the value of the variable TAX_RATE to be .0825

Input

```

#ask user for the cost of the item
cost = input("Enter item cost: ")

```

- Prompt the user for the cost of the item and store the response in the variable cost

Calculation

```

#calculate the tax
tax = cost*TAX_RATE

```

- Multiply the cost times the tax rate and store the result in the variable tax

Calculation

```

#calculate total cost
total = cost+tax

```

- Add the cost and the tax and store the result in the variable total

Output

```
#display the results
print "Cost: ", cost
print "Tax : ", tax
print "Total: ", total
```

- Display the results for the user

Exercises

1. Write the *algorithm* for a program that takes as input the number of miles a car has traveled and the number of gallons of gas the car has consumed and calculates the number of miles the car can travel on one gallon of gas

Exercises

2. Write the program for the algorithm you just generated using the tax program as a template