

Homework Assignment #3

GE 1501

Cornerstone of Engineering 1

CRN: 16504

Monday, Wednesday, Thursday from 10:30 AM - 11:35 AM

429 Dana Research Center

Wednesday, September 27, 2017

Jordan Lian

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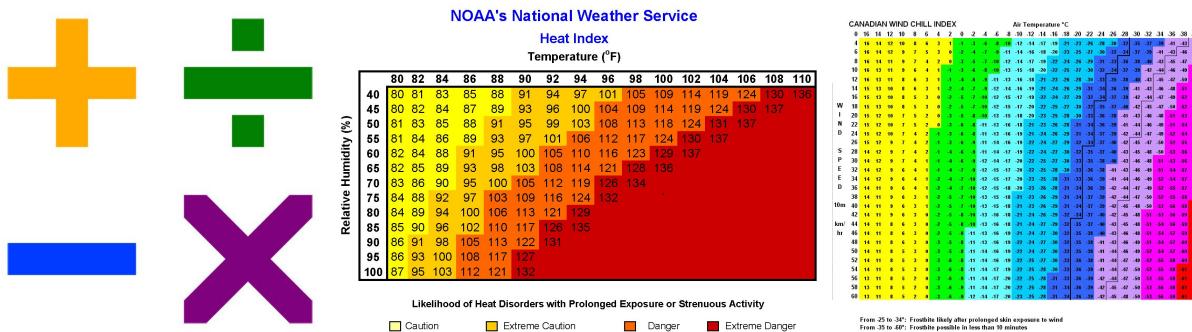
- a. Pseudocode/Flowchart
- b. Test by hand calculation
- c. Program source code .cpp file
- d. Screenshot of Outputs

2. Heat Index

- a. Pseudocode/Flowchart
- b. Test by hand calculation
- c. Program source code .cpp file
- d. Screenshot of Outputs

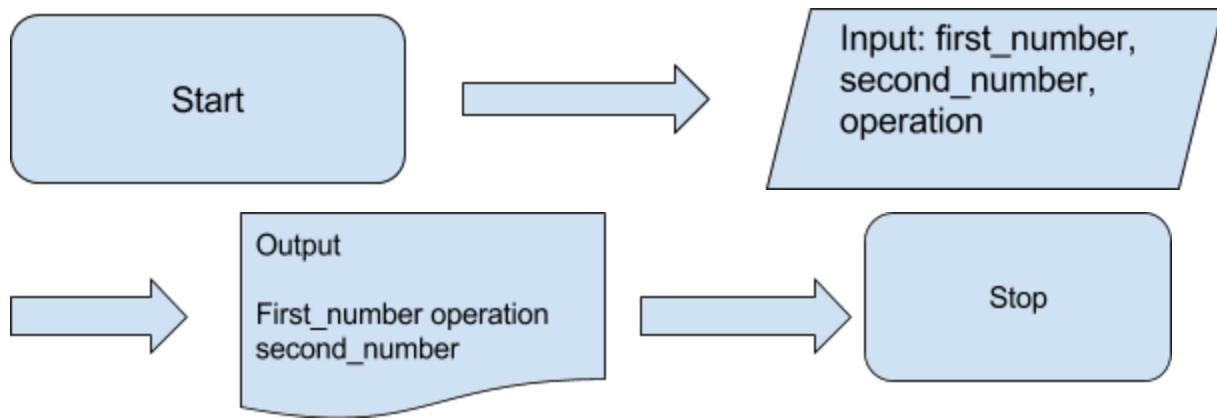
3. Wind Chill

- a. Pseudocode/Flowchart
- b. Test by hand calculation
- c. Program source code .cpp file
- d. Screenshot of Outputs



Arithmetics

Pseudocode/Flowchart



Test by hand calculation

$$\begin{aligned}2 + 3 &= 5 \\2 - 3 &= -1 \\2 * 3 &= 6 \\2 / 3 &= 0.666667\end{aligned}$$

Program source code .cpp file

See attached file

Screenshot of Outputs

D:\Northeastern University\GE 1501\HW #3 - Arithmetics.cpp - [Executing] - Dev-C++ 5.11

File Edit Search View Project Execute Tools AStyle Window Help

TDM-GCC 4.9.2 64-bit Release

Project Classes Debug HW #3 - Arithmetics.cpp

```
32 cout << "Now please enter an operation (+, -, *, /) --> ";
33 cin >> operation;
34 cout << endl;
35 //2.5
36 cout << "Please enter a number --> 2";
37 You first entered 2
38 switch
39     You just entered 3
40     case '+':
41         Now please enter an operation (+, -, *, /) --> +
42             You entered +
43             2+3 = 5
44             -----
45             Process exited after 196.5 seconds with return value 0
46             Press any key to continue . . .
47
48
49
50
51
52
53
54
55
56
57     default:
58         cout << endl;
59
60         system ("pause");
61         return 0;
62     } //end of switch
```

Compiler Resources CompileLog

Compilation results

- Errors: 0
- Warnings: 0
- Output Filename: D:\Northeastern University\GE 1501\HW #3 - Arithmetics.exe
- Output Size: 1.83358955383301 MiB
- Compilation Time: 0.53s

Type here to search

Line: 40 Col: 12 Sel: 0 Lines: 63 Length: 1971 Insert Done parsing in 0.016 seconds

8:58 AM 9/26/2017

D:\Northeastern University\GE 1501\HW #3 - Arithmetics.cpp - [Executing] - Dev-C++ 5.11

File Edit Search View Project Execute Tools AStyle Window Help

TDM-GCC 4.9.2 64-bit Release

Project Classes D:\Northeastern University\GE 1501\HW #3 - Arithmetics.exe

```
Please enter a number --> 2
You first entered 2
Please enter another number --> 3
You just entered 3
Now please enter an operation (+, -, *, /) --> -
You entered -
2-3 = -1
-----
Process exited after 2.98 seconds with return value 0
Press any key to continue . . .
```

Compiler Resources CompileLog Find Results Close

Compilation results

- Errors: 0
- Warnings: 0
- Output Filename: D:\Northeastern University\GE 1501\HW #3 - Arithmetics.exe
- Output Size: 1.83358955383301 MiB
- Compilation Time: 0.53s

Type here to search

Line: 40 Col: 12 Sel: 0 Lines: 63 Length: 1971 Insert Done parsing in 0.016 seconds

8:58 AM 9/26/2017

D:\Northeastern University\GE 1501\HW #3 - Arithmetics.cpp - [Executing] - Dev-C++ 5.11

File Edit Search View Project Execute Tools AStyle Window Help

TDM-GCC 4.9.2 64-bit Release

Project Classes Debug HW #3 - Arithmetics.cpp

```
32 cout << "Now please enter an operation (+, -, *, /) -> ";
```

D:\Northeastern University\GE 1501\HW #3 - Arithmetics.exe

```
33 Please enter a number --> 2
34 You first entered 2
35 Please enter another number --> 3
36 You just entered 3
37 Now please enter an operation (+, -, *, /) -> *
38 You entered *
39 2*3 = 6
40 -----
41 Process exited after 2.476 seconds with return value 0
42 Press any key to continue . . .
```

Compiler Resources

Compilation results...

```
-----  
- Errors: 0  
- Warnings: 0  
- Output Filename: D:\Northeastern University\GE 1501\HW #3 - Arithmetics.exe  
- Output Size: 1.83358955383301 MiB  
- Compilation Timer: 0.56s
```

Line: 40 Col: 12 Sel: 0 Lines: 63 Length: 1971 Insert Done parsing in 0.016 seconds

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D:\Northeastern University\GE 1501\HW #3 - Arithmetics.cpp - [Executing] - Dev-C++ 5.11

File Edit Search View Project Execute Tools AStyle Window Help

TDM-GCC 4.9.2 64-bit Release

Project Classes Debug HW #3 - Arithmetics.cpp

```
32 cout << "Now please enter an operation (+, -, *, /) -> ";
33 cin >> operation;
34 cout << "You entered " << operation << "\n";
35
36 // Set up compound if test and report classification
37 D:\Northeastern University\GE 1501\HW #3 - Arithmetics.exe
```

```
38 Please enter a number --> 2
39 You first entered 2
40 Please enter another number --> 3
41 You just entered 3
42 Now please enter an operation (+, -, *, /) -> /
43 You entered /
44 2/3 = 0.666667
45 -----
46 Process exited after 3.682 seconds with return value 0
47 Press any key to continue . . .
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63
```

Compiler Resources

Compilation results...

```
-----  
- Errors: 0  
- Warnings: 0  
- Output Filename: D:\Northeastern University\GE 1501\HW #3 - Arithmetics.exe  
- Output Size: 1.83358955383301 MiB  
- Compilation Timer: 0.55s
```

Line: 40 Col: 12 Sel: 0 Lines: 63 Length: 1971 Insert Done parsing in 0.016 seconds

Type here to search 8:58 AM 9/26/2017

D:\Northeastern University\GE 1501\HW #3 - Arithmetics.cpp - [Executing] - Dev-C++ 5.11

File Edit Search View Project Execute Tools AStyle Window Help

TIM-GCC 4.9.2 64-bit Release

Project Classes Debug HW #3 - Arithmetics.cpp

```
32 cout << "Now please enter an operation (+, -, *, /) -> ";
```

D:\Northeastern University\GE 1501\HW #3 - Arithmetics.exe

Please enter a number --> 2
 You first entered 2
 Please enter another number --> 3
 You just entered 3
 Now please enter an operation (+, -, *, /) -> %
 You entered %

The character you entered is not one of the defined operators
 Press any key to continue . . .

Compiler Resources

Compilation results...

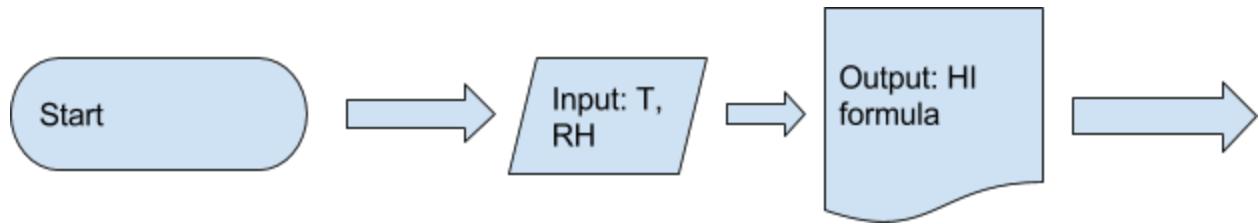
- Errors: 0
- Warnings: 0
- Output Filename: D:\Northeastern University\GE 1501\HW #3 - Arithmetics.exe
- Output Size: 1.83358955383301 MB
- Compilation Timer: 0.53s

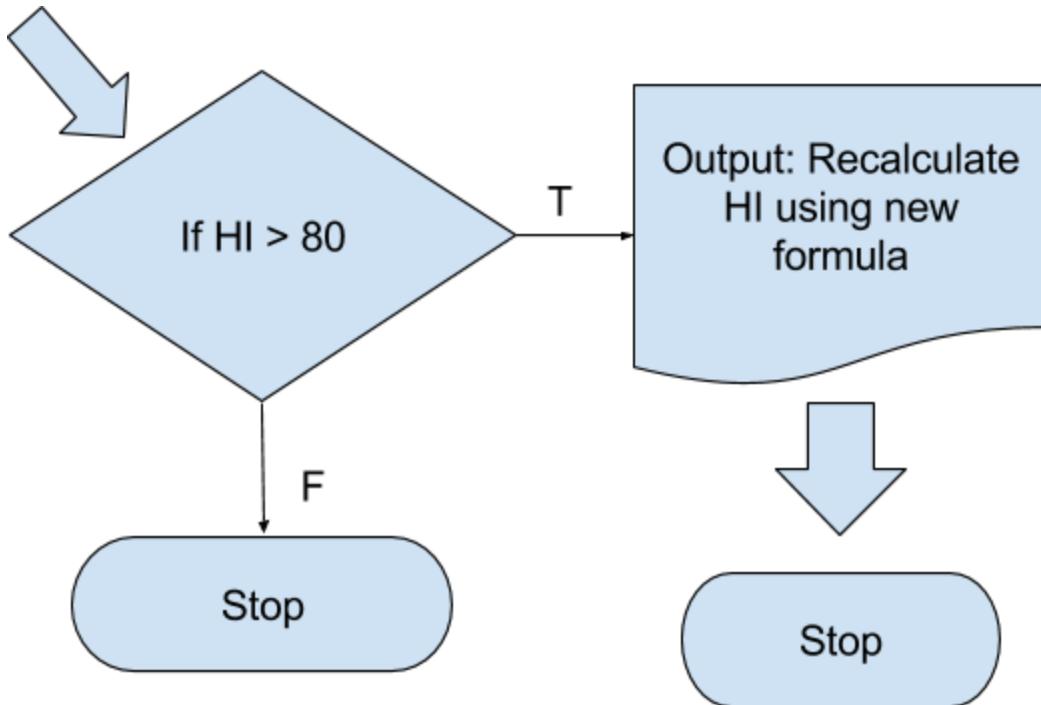
Line: 58 Col: 79 Sel: 0 Lines: 63 Length: 1973 Insert Done parsing in 0.015 seconds

Type here to search

Heat Index

Pseudocode/Flowchart





Test by hand calculation

- $HI(1) = 0.5 * \{T + 61.0 + [(T-68.0)* 1.2] + (RH*0.094)\}$
 - $HI(2) = -42.379 + 2.04901523 * T + 10.14333127 * RH - 0.22475541 * T * RH - 0.00683783 * T * T - 0.05481717 * RH * RH + .00122874 * T * T * RH + 0.00085282 * T * RH * RH - 0.00000199 * T * T * RH * RH$
1. $T = 66$ F, $RH = 50\%$
 - a. $HI(1) = 64.65$ degrees
 - b. $HI < 80$ degrees
 - c. **Final Heat Index = 64.65 degrees**
 2. $T = 79.5$ F, $RH = 88\%$
 - a. $HI(1) = 81.286$ degrees
 - b. $HI > 80$ degrees: Recalculate heat index
 - c. $HI(2) = 84.0625$ degrees
 - d. **Final Heat Index = 84.0625 degrees**

Program source code .cpp file

See attached file

Screenshot of Outputs

D:\Northeastern University\GE 1501\HW #3 - Heat Index.cpp - [Executing] - Dev-C++ 5.11

File Edit Search View Project Execute Tools Style Window Help

TDM-GCC 4.9.2 64-bit Release

Project Classes Debug HW #3 - Arithmetics.cpp HW #3 - Heat Index.cpp Battleship Classifications - If Statements.cpp Gasoline Storage Tank.cpp HW #3 - Wind Chill, Frostbite Times.cpp

```
10 //library file
11
12 #include <iostream>
13
14 D:\Northeastern University\GE 1501\HW #3 - Heat Index.exe
15 Please enter the temperature in degrees Fahrenheit --> 66
16 Please enter the relative humidity in percent --> 50
17 The calculated heat index = 64.65 degrees
18
19 Press any key to continue . . .
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43
```

heat index = " << HI2 << " degrees\n";

2874 * T * T * RH + 0.00085282 * T * RH * RH - 0.00000199 ;

Compiler Resources

Abort Compilation

Warnings: 0
Output Filename: D:\Northeastern University\GE 1501\HW #3 - Heat Index.exe
Output Size: 1.83310031890869 MiB
Compilation Time: 0.63s

Shorten compiler paths

Line: 21 Col: 42 Sel: 0 Lines: 43 Length: 1615 Insert Done parsing in 0.031 seconds

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D:\Northeastern University\GE 1501\HW #3 - Heat Index.cpp - [Executing] - Dev-C++ 5.11

File D:\Northeastern University\GE 1501\HW #3 - Heat Index.exe

Please enter the temperature in degrees Fahrenheit --> 79.5
Please enter the relative humidity in percent --> 88
The calculated heat index = 81.286 degrees.
Since the HI is greater than 80 degrees, your recalculated heat index = 84.0625 degrees
Press any key to continue . . .

Frostbite Times.cpp

```
17 * RH * RH + 0.00122874 * T * T * RH + 0.00085282 * T * RH * RH - 0.00000199 ;
```

```
37 | cout << "The calculated heat index = " << HI1 << " degrees\n";
38 |
39 | else
40 | cout << "The calculated heat index = " << HI1 << " degrees.\nSince the HI is greater than 80 degrees, your recalculated heat index = " << HI2 << " degrees\n";
41 |
42 system ("pause");
43 return 0;} //end of main
```

Compiler Resources

Abort Compilation

Compile Log Debug Find Results Close

Warnings: 0
Output Filename: D:\Northeastern University\GE 1501\HW #3 - Heat Index.exe
Output Size: 1.83310031890869 MiB
Compilation Time: 0.63s

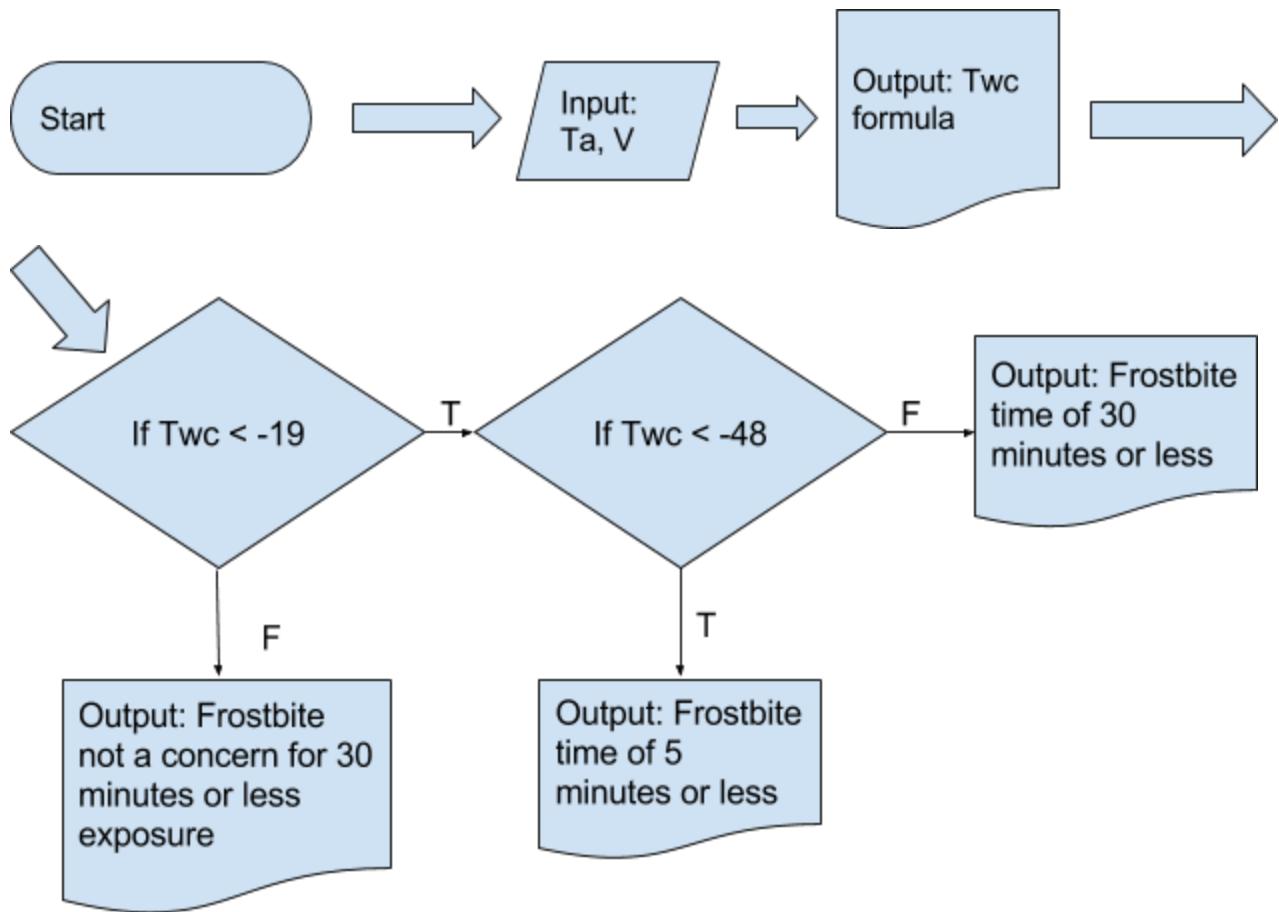
Shorten compiler paths

Line: 21 Col: 42 Sel: 0 Lines: 43 Length: 1615 Insert Done parsing in 0.031 seconds

Type here to search 107 PM 9/26/2017

Wind Chill

Pseudocode/Flowchart



Test by hand calculation

$$T_{wc} = 35.74 + 0.6215T_a - 35.75V^{+0.16} + 0.4275T_aV^{+0.16}$$

- a. $T_a = 0$ F, $V = 35$ mph
 - i. $T_{wc} = -27.4033$ degrees
 - ii. $-48 < -27 < -19$, so reported frostbite time is 30 minutes or less
- b. $T_a = 6$ F, $V = 56$ mph
 - i. $T_{wc} = -23.7215$ degrees
 - ii. $-48 < -24 < -19$, so reported frostbite time is 30 minutes or less
- c. $T_a = 43$ F, $V = 10$ mph

- i. $T_{wc} = 37.3608$ degrees
- ii. $37 > -19$, so frostbite isn't a concern for 30 minutes or less exposure

Program source code .cpp file

See attached file

Screenshot of Outputs

The screenshot shows the Dev-C++ IDE interface. The main window displays the program's output:

```
Please enter the air temperature in degrees Fahrenheit --> 0
Please enter the wind velocity in miles per hour --> 35
The calculated wind chill index (Twc) = -27.4033 degrees
Reported frostbite time: 30 minutes or less
Press any key to continue . . .
```

The bottom panel shows the compiler log:

```
//2. Set up if test
33
34
35 if (Twc < -48)
```

Output details from the log:

- Warnings: 0
- Output Filename: D:\Northeastern University\GE 1501\HW #3 - Wind Chill, Frostbite Times.exe
- Output Size: 1.8560237845215 MiB
- Compilation Time: 0.55s

The taskbar at the bottom shows various application icons.

D:\Northeastern University\GE 1501\HW #3 - Wind Chill, Frostbite Times.cpp - [Executing] - Dev-C++ 5.11

File Edit Search View Project Execute Tools AStyle Window Help

TDM-GCC 4.9.2 64-bit Release

Project Classes D:\Northeastern University\GE 1501\HW #3 - Wind Chill, Frostbite Times.exe

Please enter the air temperature in degrees Fahrenheit --> 6
Please enter the wind velocity in miles per hour --> 56
The calculated wind chill index (T_{WC}) = -23.7215 degrees
Reported frostbite time: 30 minutes or less
Press any key to continue . . .

33 //2. Set up if test
34
35 if (T_{WC} < -48)

Compiler Resources Compile Log Debug Find Results Close

Abort Compilation

Warnings: 0
Output Filename: D:\Northeastern University\GE 1501\HW #3 - Wind Chill, Frostbite Times.exe
Output Size: 1.85602378845215 MiB
Compilation Time: 0.52s

Shorten compiler paths

Line: 30 Col: 21 Sel: 0 Lines: 49 Length: 1451 Insert Done parsing in 0.031 seconds

Type here to search 12:17 PM 9/26/2017

D:\Northeastern University\GE 1501\HW #3 - Wind Chill, Frostbite Times.cpp - [Executing] - Dev-C++ 5.11

File Edit Search View Project Execute Tools AStyle Window Help

TDM-GCC 4.9.2 64-bit Release

Project Classes Debug HW #3 - Arithmetics.cpp HW #3 - Heat Index.cpp Battleship Classifications - If Statements.cpp Gasoline Storage Tank.cpp HW #3 - Wind Chill, Frostbite Times.cpp

Please enter the air temperature in degrees Fahrenheit --> 43
Please enter the wind velocity in miles per hour --> 10
The calculated wind chill index (T_{WC}) = 37.3608 degrees
Frostbite not a concern for 30 minutes or less exposure
Press any key to continue . . .

1 /*

Compiler Resources Compile Log Debug Find Results Close

Abort Compilation

Warnings: 0
Output Filename: D:\Northeastern University\GE 1501\HW #3 - Wind Chill, Frostbite Times.exe
Output Size: 1.85602378845215 MiB
Compilation Time: 0.52s

Shorten compiler paths

Line: 30 Col: 21 Sel: 0 Lines: 49 Length: 1451 Insert Done parsing in 0.031 seconds

Type here to search 12:18 PM 9/26/2017