Computer Science & Engineering 150A
Problem Solving Using Computers – Laboratory
Lecture 03 – Input and Math

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Spring 2009

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We’re new, ok?

Code Lab is $25, meant to be a “textbook-like” purchase.

Too late for that. Optional, and recommended.

Instead of grading Code Lab, more take-home work!

<table>
<thead>
<tr>
<th>Grade Item</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-lab assignments</td>
<td>60%</td>
</tr>
<tr>
<td>Take-home homework/quizzes</td>
<td>40%</td>
</tr>
</tbody>
</table>
Input: scanf

- scanf("format string", parameters...);
- Use the same as printf, except for & before variables.
  
  scanf("%d %lf", &myInt, &myDouble);

- Be sure to define variables ahead of time!
#include <stdio.h>
int main(void)
{
    int rating;
    scanf("%d", &rating);
    printf("I give this class %d stars out of 10!\n", rating);
    return 0;
}
Math: Operations

● Set a value (═)

```java
int myVariable = 50;
```

● Addition (+), Subtraction (−)

```java
a = b + c;   d = e - f;
```

● Multiplication (∗), Division (/), Remainder (％)

```java
product = A * B;   quotient = C / D;
remain = E % F;
```

Be careful of rounding! When in doubt, use doubles. Or, use 25.0, −1.0, (add .0) when using integer literals.
Math: Compound Operations

<table>
<thead>
<tr>
<th>Math Expression</th>
<th>C Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{ab}{1-c} )</td>
<td>((a \times b) / (1 - c))</td>
</tr>
<tr>
<td>(x^2 + x + 1)</td>
<td>(x \times x + x + 1)</td>
</tr>
</tbody>
</table>

- Watch order of operations!
# Math: Functions

<table>
<thead>
<tr>
<th>Function 1</th>
<th>Function 2</th>
<th>Function 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>abs(x)</td>
<td>fabs(x)</td>
<td>pow(x, y)</td>
</tr>
<tr>
<td>ceil(x)</td>
<td>floor(x)</td>
<td>sin(x)</td>
</tr>
<tr>
<td>cos(x)</td>
<td>log(x)</td>
<td>sqrt(x)</td>
</tr>
<tr>
<td>exp(x)</td>
<td>log10(x)</td>
<td>tan(x)</td>
</tr>
</tbody>
</table>
## Math: Compound Functions

<table>
<thead>
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<th>Math Expression</th>
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</tr>
</thead>
<tbody>
<tr>
<td>$5 \tan(x - 1)$</td>
<td>$5.0 \times \tan(x-1)$</td>
</tr>
<tr>
<td>$\frac{1}{\sqrt{1-x^2}}$</td>
<td><code>fabs(1.0/sqrt(1-x*x))</code></td>
</tr>
</tbody>
</table>
Example: Quadratic Formula

\[ ax^2 + bx + c = 0 \]

\[ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]
Cheat Sheet

Functions: abs(x) ceil(x) cos(x) exp(x) fabs(x) floor(x) log(x) log10(x) pow(x,y) sin(x) sqrt(x) tan(x)

Operators: + - * / %

scanf: scanf("%d", &myInt);
scanf("%lf", &myDouble);