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2/3/2014
ECE 540
Dr. Day

Homework 1: Accuracy, Precision and Learning to Interpret Numbers

1. For the first problem we had to identify the type of error made in two example sentences.
   a. The first was “the average man in the United States is 178.2134 cm or 5' 10.1628"”. The problem here is that the number appears to be overly precise and potentially misleading.
   b. The other statement, “Company XYZ's profits increased by 200 percent! The actual return on investment increased from 2 percent to 6 percent.” Is confusing because they use the same numerical facts represented in two ways, which attempts to draw different conclusions.

Misleading Presentation

2. Huff calls it a ‘gee-whiz-graph’ because it overly exaggerates the data. There are a couple problems with this graph, the biggest being that there is no zero point shown. Also the fact that the Quarterly Reporting (Y Axis) is only given between 8.1 and 8.7 makes it appear more dramatic than it really was.
3. I intend to use Microsoft Visual Studio 2013 on a PC, and then use Matlab for my graphs.
4. Write a C-funtion that computes precision for a given reference value.

```
double PrecisionVersusBase( double Base )
{
	double Precision = Base;

	//Loops until Precision is negligible
	while ( Base + Precision > Base )
		Precision /= 2.0;

	Precision *= 2.0;		//Multiply by two to become accurate

	return Precision;
}
```

Need commenting before function along with through the function and at the end
-1

Commenting
-1

5. The fifth problem had us compute epsilon for a base value ranging from 1.0 to $1e^{-30}$ by reducing the base by a factor of 10 each iteration.

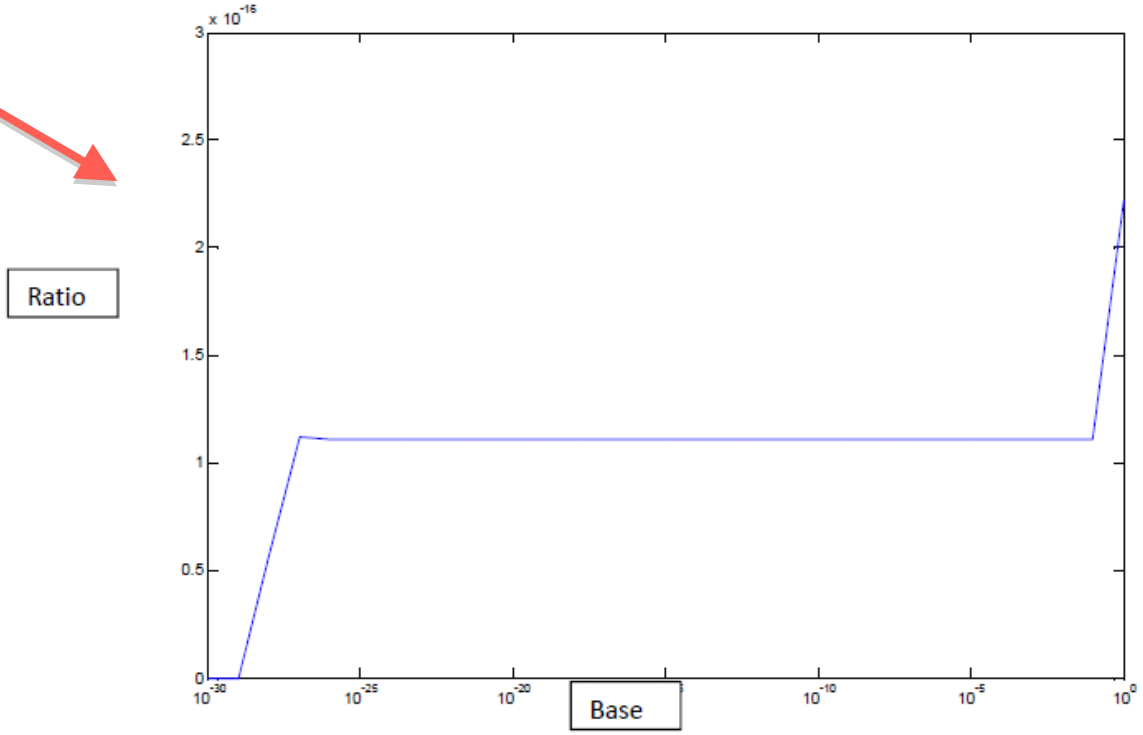
```
void ComputeEpsilon( double base )
{
	FILE *fout;

	double Precision = 0.00;
	double Epsilon = 0.00;
	double Ratio = 0.00;

	double Exponent = pow( 10.0, -30.0 );
	fout = fopen( "Output.csv", "w" );
```

```
    //This calls the ComputeEpsilon function, calculates the ration,
    and then updates the base until it reaches 1e-30
    while ( base >= Exponent )
    {
          Epsilon = PrecisionVersusBase( base );
          Ratio = Epsilon / base;
          printf( "\n\nBase: %.60lf \nEpsilon: %.68lf\nratio: %.50lf",
                           base, Epsilon, Ratio );
          fprintf( fout, "%.60lf %.60lf, %.60lf\n", base, Epsilon,
                           Ratio );
          base /= 10;
    }
    fclose( fout );
}
```

Charts

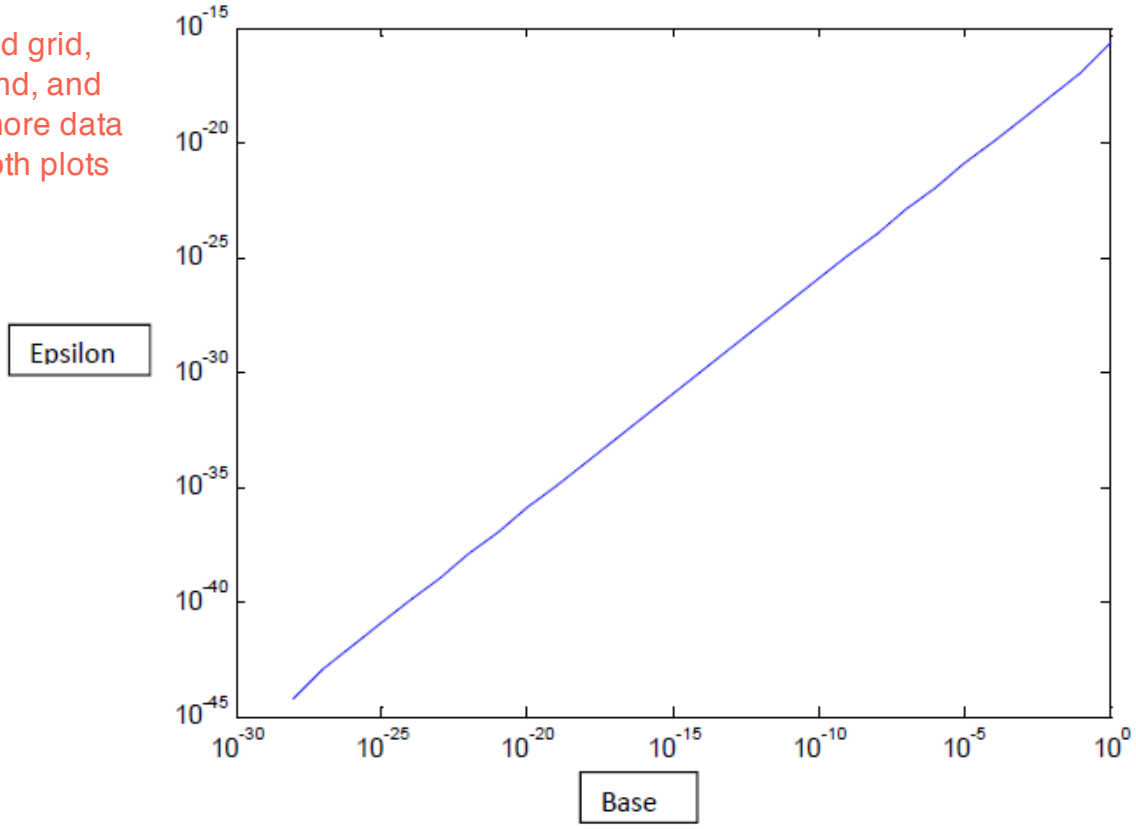
Ratio vs Base (Figure 5a)

wrong plus need more data



Epsilon vs Base (Figure 5b)

Need grid, legend, and also more data on both plots



1-a) False Precision	3/3
1-b) Miss Leading Presentation	0/3
2) Gee-Whiz Graph	1/1
Add zero to y axis	1/1
3) Describing system	2/2
4) Function	
a) Commenting	1/1
b) Prototype Correct	1/1
c) Proper implementation	1/1
5) Test Program and plotting.	
a) Code properly works through base	1/1
b) Commenting	0/1
c) Plots	
Labels of axis and Titles	0/1
Grid and Legend	0/1
Log Log plots showing details	0/1
Total	11/18