

## Math-13 Sections 01 and 02

### Homework #3 Solutions

1. Determine the smallest estimate for  $\pi + e$  that is within 0.000005 of the exact value.

Using a calculator:  $\pi + e = 5.859874482 \dots$

$$(\pi + e) - 5 = 0.859874482 \dots > 0.000005$$

$$(\pi + e) - 5.8 = 0.059874482 \dots > 0.000005$$

$$(\pi + e) - 5.85 = 0.009874482 \dots > 0.000005$$

$$(\pi + e) - 5.859 = 0.000874482 \dots > 0.000005$$

$$(\pi + e) - 5.8598 = 0.000074482 \dots > 0.000005$$

$$(\pi + e) - 5.85987 = 0.000004482 \dots < 0.000005$$

$$\pi + e \approx 5.85987$$

2. Using a table of values, determine the following:

$$\lim_{x \rightarrow 0} \frac{\cos x - 1}{x}$$

Be sure to approach 0 from both sides in your table.

Make sure that your calculator is in radians mode!

1	-0.459698
0.1	-0.049958
0.01	-0.005000
0.001	-0.000500
0.0001	-0.000050
0	???
-0.0001	0.000050
-0.001	0.000500
-0.01	0.005000
-0.1	0.049958
-1	0.459698

So it appears that:

$$\lim_{x \rightarrow 0} \frac{\cos x - 1}{x} = 0$$