Okeefe Niemann
4/2/2014
1281465
PHYS 115

Assignment 1

1 Question 1

1.1 Part a

- Input:

```
#include<stdio.h>
#include<math.h>

double f(double x)
{
        return 1 / (1+x);
}

int main()
{
        double x, a, b, h, exact, ans, trap();
        int i, n, iter, ITERMAX;

        exact = log((double) 2);
        ITERMAX= 8;
        b = 1.0;
        a = 0;

        printf ("            h            ans        (exact - ans)/h^2 \n");
        n=1;

        for (iter = 0; iter < ITERMAX; iter++) {
                h = (b - a) / n;
                ans = trap (f, a, b, n);
                n *= 2;
                printf ("%12.5f %12.5f%12.5f \n", h, ans, (ans-exact)/(h*h));
        }
}
```

- Output:

```
        h            ans      (exact - ans)/h^2
    1.00000      0.75000        0.05685
    0.50000      0.70833        0.06074
    0.25000      0.69702        0.06203
    0.12500      0.69412        0.06238
    0.06250      0.69339        0.06247
    0.03125      0.69321        0.06249
    0.01562      0.69316        0.06250
    0.00781      0.69315        0.06250
```

1.2 Part b

$$-\frac{1}{12}[f'(b) - f'(a)] = -\frac{1}{12}[-.25 + 1] = .06245 = \frac{I - T}{h^2}$$

Therefore, the constant that h approached in part (a) corresponds to the coefficient of the leading error in the trapezium rule.

2   Question 2