# Discussion 13

Eric Hirsch

11/15/2021

***p.359 #11. Find the area from 0 to 1 between these functions: y=4^x and y=2^x.***

We can use the Fundamental Theorem of Calculus 2 for this:

$$\int_a^b (f(x) - g(x))dx$$

The integrals are

$$4^x/ln(4) + C$$

and

$$2^x/ln(2) + C$$

0 to 1 is an easy interval to ingrate over since we get

$$4/ln(4) - 1/ln(4) = 3/ln(4)$$

and

$$2/ln(2) - 1/ln(2) = 1/ln(2)$$

. Here we use R to do the math:

```
int1 <- function(x) {4^x}
q1 <- integrate(int1, lower = 0, upper = 1)
q1
```

```
## 2.164043 with absolute error < 2.4e-14
```

```
int2 <- function(x) {2^x}
q2 <- integrate(int2, lower = 0, upper = 1)
q2
```

```
## 1.442695 with absolute error < 1.6e-14
```

```
q1$value - q2$value
```

```
## [1] 0.7213475
```

Area is .7213475

And to check:

```
3/log(4)-1/log(2)
```

```
## [1] 0.7213475
```