DA 605 - Assignment 14

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Compute the Taylor Series Expansions:

FUNCTIONS: f(x) = 1/(1-x)

x in (-1,1)

```
one_over_one_minus_x_normal <- function(x){
  return (1/(1-x))
}

one_over_one_minus_x_taylor <- function(x){
  if((x <= -1)||(x >= 1)){
    return (0)
  }

  answer <- 0
  for (n in 0:1000){
    answer <- answer + (x^n)
  }
  return (answer)
}
```

TESTING: f(x) = 1/(1-x)

x in (-1,1)

```
one_over_one_minus_x_normal(-0.99)
```

```
## [1] 0.5025126
```

```
one_over_one_minus_x_taylor(-0.99)
```

```
## [1] 0.502534
```

```
one_over_one_minus_x_normal(-0.25)
```

```
## [1] 0.8
```

```
one_over_one_minus_x_taylor(-0.25)
```

```
## [1] 0.8
```

```r
one_over_one_minus_x_normal(0)
```

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

```r
one_over_one_minus_x_taylor(0)
```

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

```r
one_over_one_minus_x_normal(0.85)
```

```
## [1] 6.666667
```

```r
one_over_one_minus_x_taylor(0.85)
```

```
## [1] 6.666667
```

FUNCTIONS: f(x) = e^x

```r
e_to_the_x_normal <- function(x){
  return (exp(x))
}

e_to_the_x_taylor <- function(x){
  answer <- 0
  for (n in 0:100){
    answer <- answer + (x^n)/factorial(n)
  }
  return (answer)
}
```

TESTING: f(x) = e^x

```r
e_to_the_x_normal(0)
```

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

```r
e_to_the_x_taylor(0)
```

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

```r
e_to_the_x_normal(1)
```

```
## [1] 2.718282
```

```r
e_to_the_x_taylor(1)
```

```
## [1] 2.718282
```

```r
e_to_the_x_normal(8)
```

```
## [1] 2980.958
```

```r
e_to_the_x_taylor(8)
```

```
## [1] 2980.958
```

FUNCTIONS: f(x) = ln(1+x)

x in (-1,1]

```r
log_1_plus_x_normal <- function(x){
  if((x <= -1)||(x > 1)){
    return (0)
  }
  return (log(1+x))
}

log_1_plus_x_taylor <- function(x){
  answer <- 0
  for (n in 1:1000){
    answer <- answer + (((-1)^(n+1))*((x^n)/n))
  }
  return (answer)
}
```

TESTING: f(x) = ln(1+x)

x in (-1,1]

```r
log_1_plus_x_normal(-0.99)
```

```
## [1] -4.60517
```

```r
log_1_plus_x_taylor(-0.99)
```

```
## [1] -4.605166
```

```r
log_1_plus_x_normal(-0.33)
```

```
## [1] -0.4004776
```

```r
log_1_plus_x_taylor(-0.33)
```

```
## [1] -0.4004776
```

```r
log_1_plus_x_normal(0)
```

```
## [1] 0
```

```r
log_1_plus_x_taylor(0)
```

```
## [1] 0
```

```r
log_1_plus_x_normal(0.5)
```

```
## [1] 0.4054651
```

```r
log_1_plus_x_taylor(0.5)
```

```
## [1] 0.4054651
```

```r
log_1_plus_x_normal(1)
```

```
## [1] 0.6931472
```

```r
log_1_plus_x_taylor(1)
```

```
## [1] 0.6926474
```