Assignment Week 14

Ben Arancibia

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Taylor Series Approximation is an attempt to approximate a function in terms of other functions that are easier to calculate. Taylor Series is used to represent functions as an infinte sum of polynominal terms that are calculated using a function's derivatives evaluated at a single point.

```
require(pracma)
```

```
## Loading required package: pracma
```

For the function $f(x) = 1/(1-x)$ the Taylor Series expansion is: $1 + x + x^2 + x^3 + O$. This can be written as the sum of x^n.

```
f <- function(x) 1/(1 - x)
p <- taylor(f, -1, 4)
polyval(p, -1:1)
```

```
## [1] 0.5000000 0.9687495 2.4999921
```

For the function $f(x) = e^x$ the Taylor Series Expansion is $1 + x + (x^2)/2! + (x^3)/3! + (x^4)/4! + O$ this can be written as the sum of $(x^n)/n!$.

For the function $f(x) = \ln(1+x)$ the Taylor Series Expansion is $x - (x^3)/3! + (x^5)/5! - (x^7)/7!$ this cna be written as the sum of $((-1)^n + 1) * ((x^n)/n)$.

```
f3 <- function(x) log(1+x)
p3 <- taylor(f3, 1, 4)
polyval(p3, -1:1)
```

```
## [1] -1.39016780  0.01085664  0.69314718
```