Graded Problem Set 5

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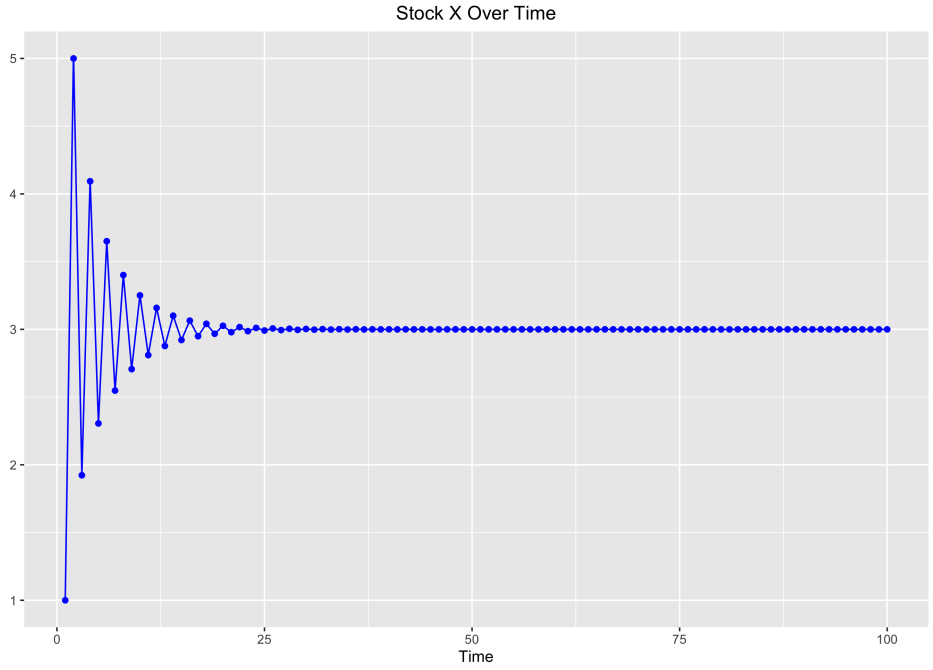
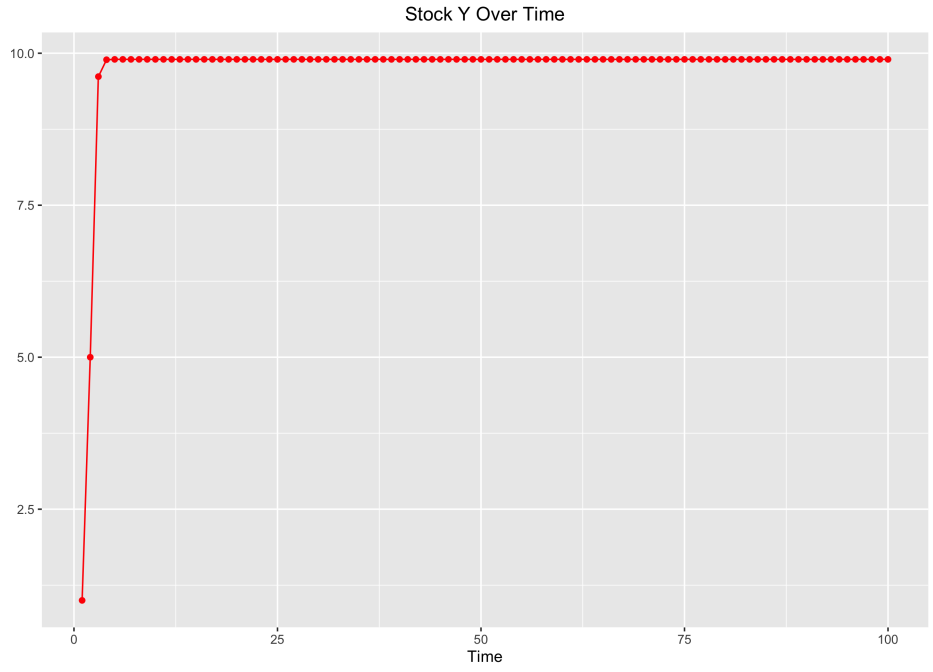
Stock Market Investment Decisions

Question 1

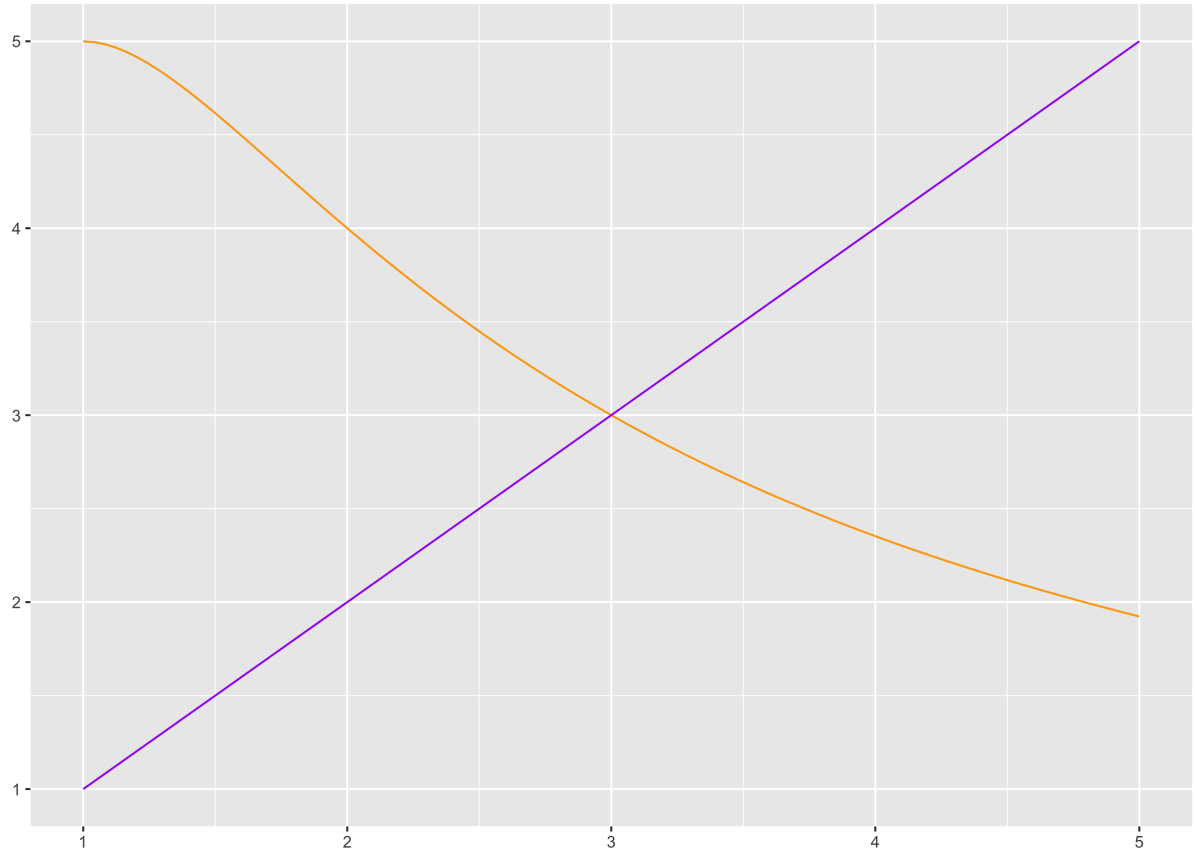
As seen in the graphs below, only stock X shows oscillatory behavior. However, stock X's oscilatory behavior is finite as it converges.





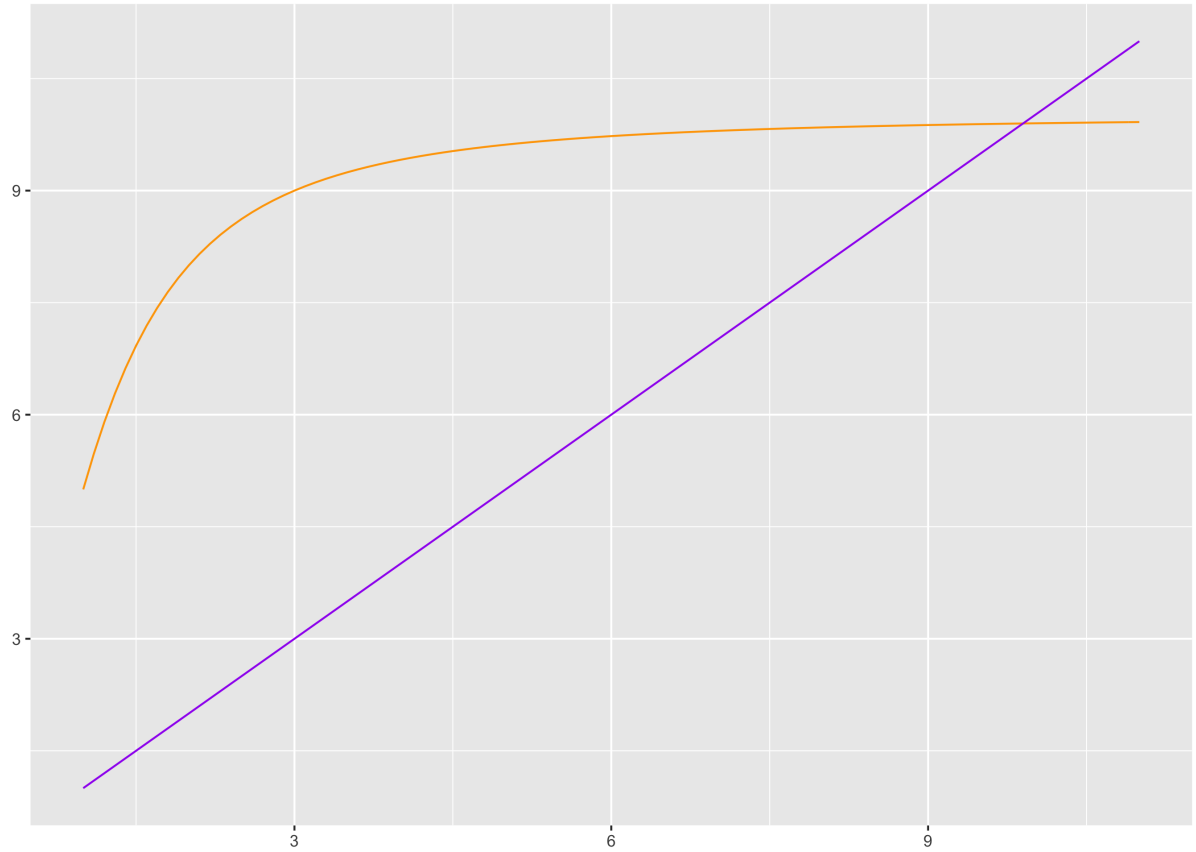
Question 2

For stock X, the graph below show the $f(x) = \dfrac{10x}{1+x^2}$ and $g(x) = x$



They clearly converge at $x = 3$ and this can easily be verifies. $f(3) = \dfrac{10(3)}{1+3^2} = \dfrac{30}{10} = 3$ and $g(3) = 3$

For stock Y, the graph below show the $f(y) = \dfrac{10y^2}{1+y^2}$ and $g(y) = y$



To find the point of intersection:

$$\frac{10(y^2)}{1+y^2} - y = 0 \Rightarrow \frac{10(y^2)}{1+y^2} = y \Rightarrow 10(y)1 + y^2 = 1 \Rightarrow 10y = 1 + y^2 \Rightarrow y^2 - 10y + 1 = 0$$

```
a <- 1
b <- -10
c <- 1
(-b + sqrt(b^2 - 4 * a * c))/(2*a)
```

```
## [1] 9.898979
```

Looking at the data:

```
data <- read.csv("stock_data.csv")
data[69,"x"]
```

```
## [1] 3
```

```
data[7,"y"]
```

```
## [1] 9.898979
```

By Brouwer's Theorem, we can conclude that stock X converges to 3, starting from $t = 69$ and stock Y converges to 9.898979 starting from $t = 7$

Question 3:

Over time, Y is the better better stock as stock Y converges to a higher price than stock X.