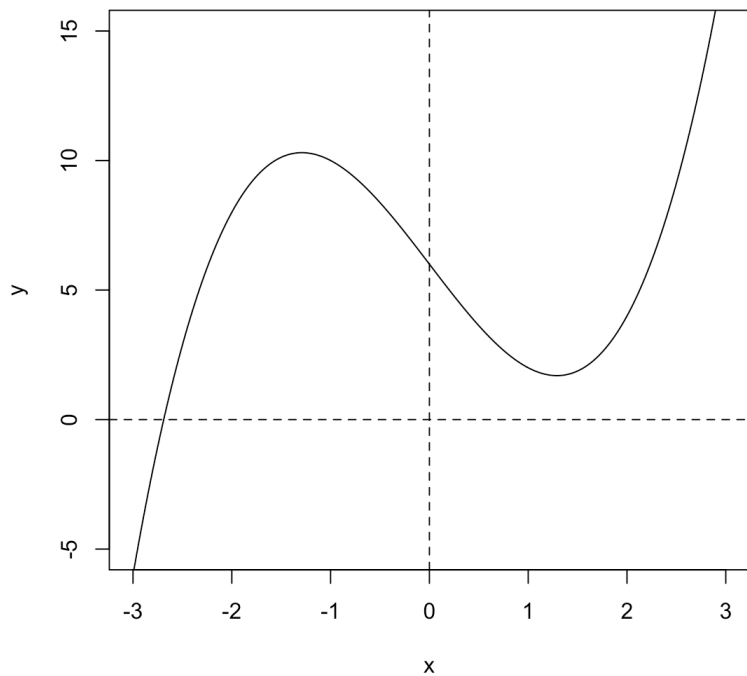


Part I Chapter 2.4

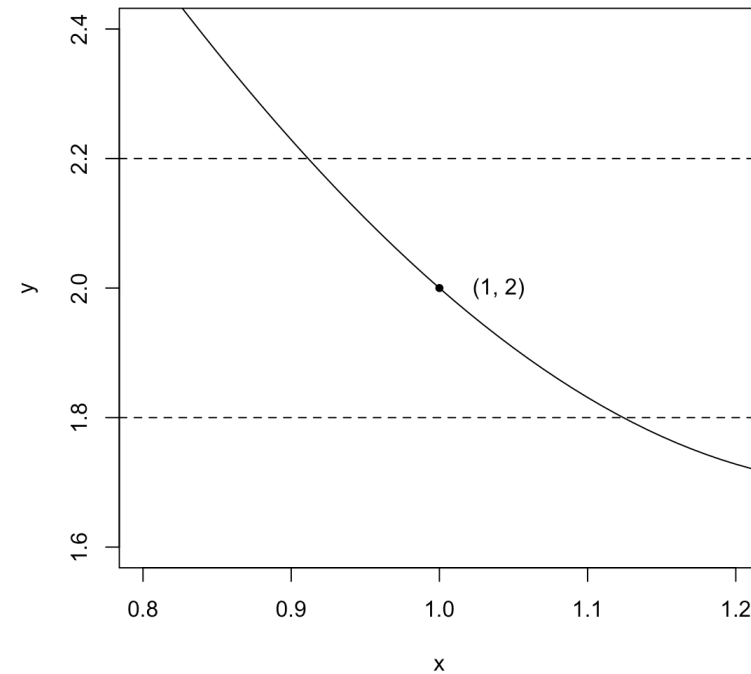
```
options(scipen = 7)
```

Example 1.

```
x <- seq(-3, 3, by = 0.01)
y <- x^3 - 5*x + 6
plot(x, y, xlim = c(-3, 3), ylim = c(-5, 15), type = "l")
abline(h = 0, v = 0, lty = 2)
```



```
plot(x, y, xlim = c(0.8, 1.2), ylim = c(1.6, 2.4), type = "l")
abline(h = c(1.8, 2.2), lty = 2)
points(x = 1, y = 2, pch = 20)
text(x = 1.04, y = 2.0, labels = "(1, 2)")
```



```
(xdelta <- seq(0.8, 1.2, by = 0.01))
```

```
## [1] 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89 0.90 0.91 0.92 0.93
## [15] 0.94 0.95 0.96 0.97 0.98 0.99 1.00 1.01 1.02 1.03 1.04 1.05 1.06 1.07
## [29] 1.08 1.09 1.10 1.11 1.12 1.13 1.14 1.15 1.16 1.17 1.18 1.19 1.20
```

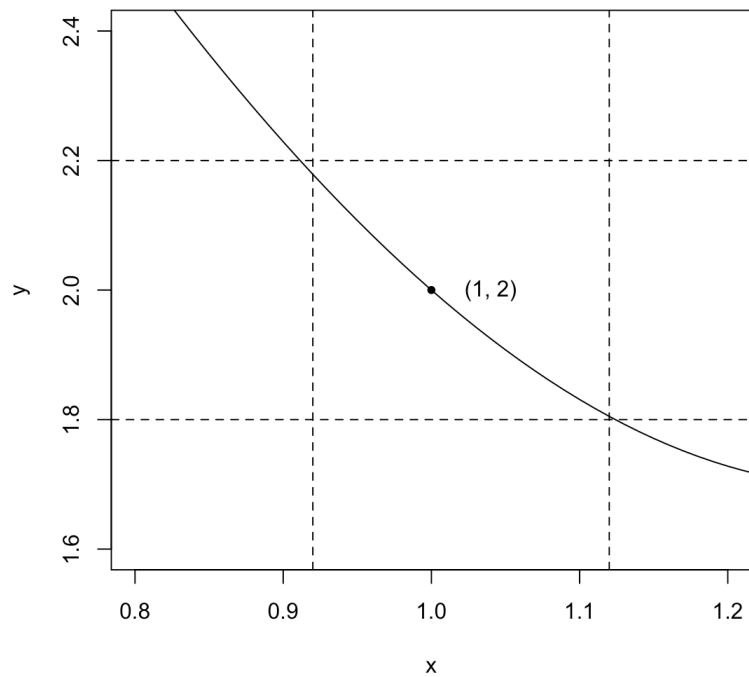
```
abs((xdelta^3 - 5*xdelta + 6) - 2) < 0.2
```

```
## [1] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
## [12] FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [23] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [34] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
```

```
xdelta[abs((xdelta^3 - 5*xdelta + 6) - 2) < 0.2]
```

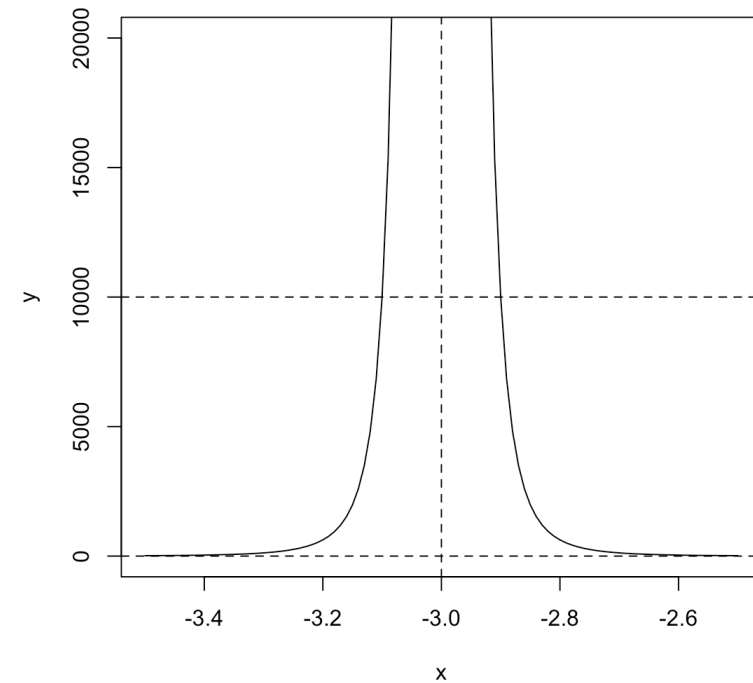
```
## [1] 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 1.00 1.01 1.02 1.03 1.04 1.05
## [15] 1.06 1.07 1.08 1.09 1.10 1.11 1.12
```

```
plot(x, y, xlim = c(0.8, 1.2), ylim = c(1.6, 2.4), type = "l")
abline(h = c(1.8, 2.2), lty = 2)
points(x = 1, y = 2, pch = 20)
text(x = 1.04, y = 2.0, labels = "(1, 2)")
abline(v = c(0.92, 1.12), lty = 2)
```



2.4-12

```
x <- seq(-3.5, -2.5, by = 0.01)
y <- 1/(x + 3)^4
plot(x, y, ylim = c(0, 20000), type = "l")
abline(h = c(0, 10000), v = -3, lty = 2)
```



```
(xdelta2 <- seq(-3.2, -2.8, by = 0.01))
```

```
## [1] -3.20 -3.19 -3.18 -3.17 -3.16 -3.15 -3.14 -3.13 -3.12 -3.11 -3.10
## [12] -3.09 -3.08 -3.07 -3.06 -3.05 -3.04 -3.03 -3.02 -3.01 -3.00 -2.99
## [23] -2.98 -2.97 -2.96 -2.95 -2.94 -2.93 -2.92 -2.91 -2.90 -2.89 -2.88
## [34] -2.87 -2.86 -2.85 -2.84 -2.83 -2.82 -2.81 -2.80
```

```
1/(xdelta2 + 3)^4 > 10000
```

```
## [1] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
## [12] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [23] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE
## [34] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
```

```
which(1/(xdelta2 + 3)^4 > 10000)
```

```
## [1] 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
```

```
xdelta2[1/(xdelta2 + 3)^4 > 10000]
```

```
## [1] -3.09 -3.08 -3.07 -3.06 -3.05 -3.04 -3.03 -3.02 -3.01 -3.00 -2.99  
## [12] -2.98 -2.97 -2.96 -2.95 -2.94 -2.93 -2.92 -2.91 -2.90
```

```
plot(x, y, xlim = c(-3.2, -2.8), ylim = c(5000, 15000), type = "l")  
abline(h = c(0, 10000), v = c(-3.09, -3, -2.9), lty = 2)
```

