ph1855_hw9_ygu5

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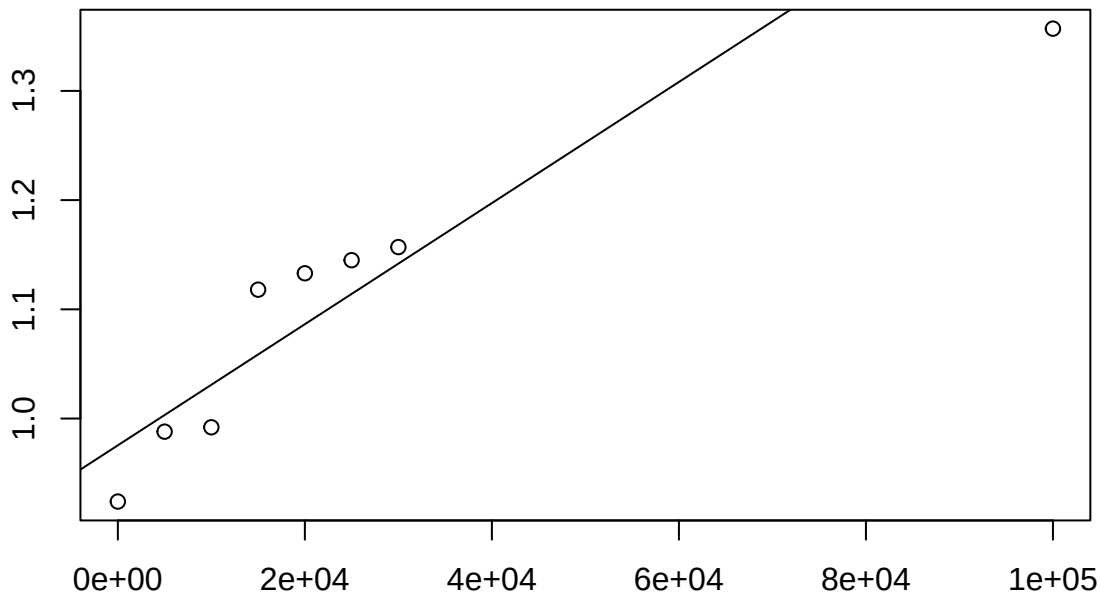
Hollander et al. Nonparametric Statistical Methods 2014

P457 Q1

```
X = c(0,5000,10000,15000,20000,25000,30000,100000)
Y = c(0.924,0.988,0.992,1.118,1.133,1.145,1.157,1.357)
theil(X, Y, beta.0 = 0, type = "u")
```

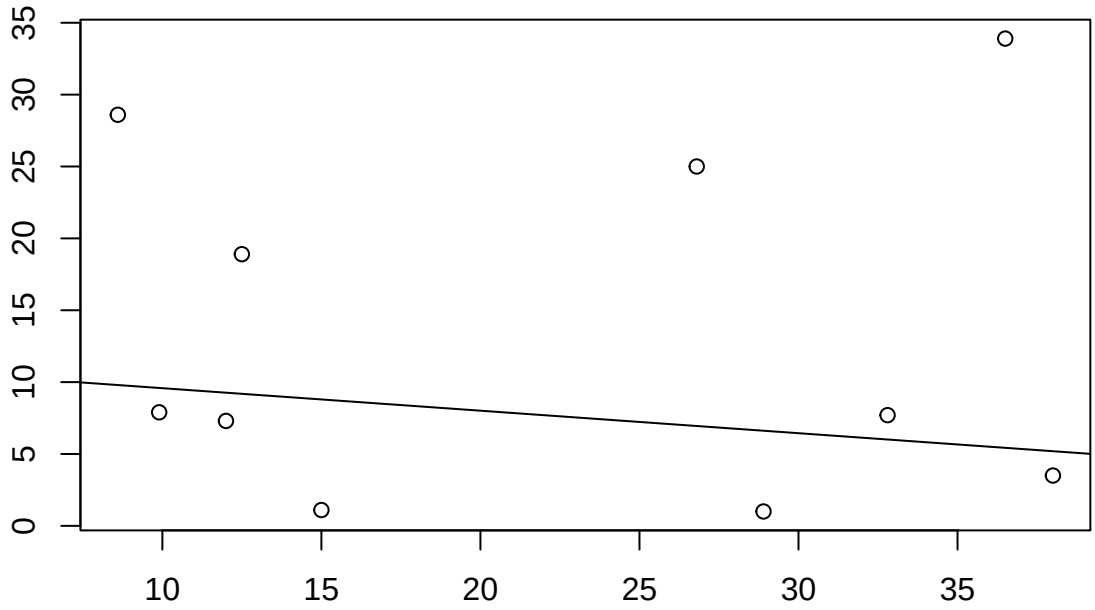



```
## Alternative: beta greater than 0
## C = 28, C.bar = 1, P = 0
```

```
## beta.hat = 0
## alpha.hat = 0.975
##
## 1 - alpha = 0.95 upper bound for beta:
## -Inf, 0
```

P457 Q3

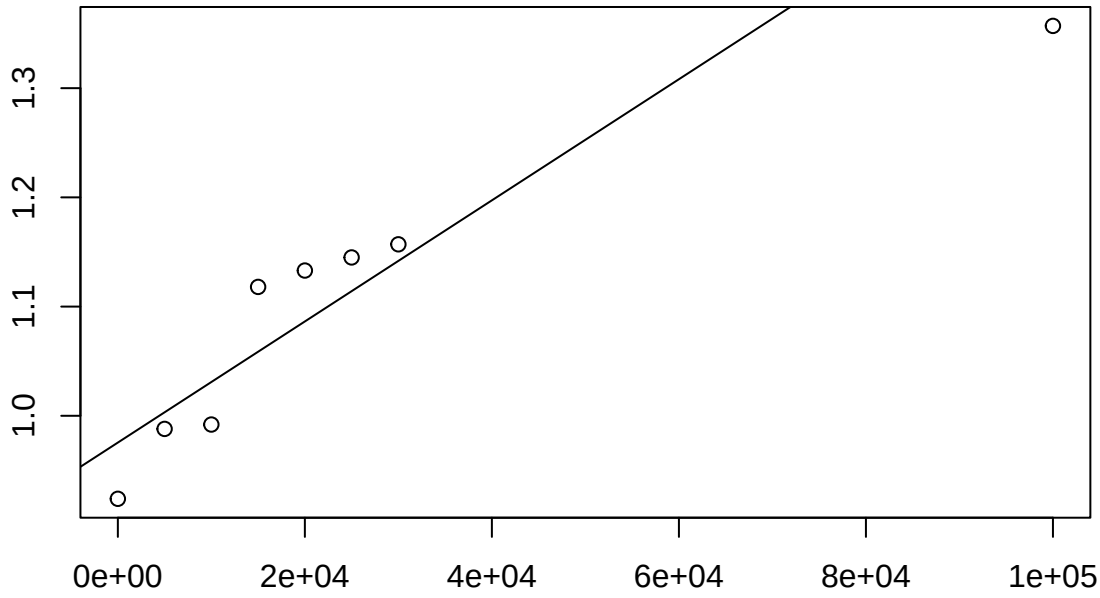
```
Cys = c(28.9,32.8,12.0,9.9,15.0,38.0,12.5,36.5,8.6,26.8)
Worms=c(1.0,7.7,7.3,7.9,1.1,3.5,18.9,33.9,28.6,25.0)
theil(Cys, Worms, beta.0 = 0, type = "u")
```




```
## Alternative: beta greater than 0
## C = -7, C.bar = -0.156, P = 0.758
## beta.hat = -0.157
## alpha.hat = 11.143
##
## 1 - alpha = 0.95 upper bound for beta:
## -Inf, 0.625
```

P460 Q7

```
X = c(0,5000,10000,15000,20000,25000,30000,100000)
Y = c(0.924,0.988,0.992,1.118,1.133,1.145,1.157,1.357)
theil(X, Y, slopes = T)
```




```
## Alternative: beta not equal to 0
## C = 28, C.bar = 1, P = 0
## beta.hat = 0
## alpha.hat = 0.975
##
## All slopes:
##  i j         S.ij
##  1 2 1.280000e-05
##  1 3 6.800000e-06
##  1 4 1.293333e-05
##  1 5 1.045000e-05
##  1 6 8.840000e-06
##  1 7 7.766667e-06
##  1 8 4.330000e-06
##  2 3 8.000000e-07
##  2 4 1.300000e-05
##  2 5 9.666667e-06
##  2 6 7.850000e-06
```

```
##  2 7 6.760000e-06
##  2 8 3.884211e-06
##  3 4 2.520000e-05
##  3 5 1.410000e-05
##  3 6 1.020000e-05
##  3 7 8.250000e-06
##  3 8 4.055556e-06
##  4 5 3.000000e-06
##  4 6 2.700000e-06
##  4 7 2.600000e-06
##  4 8 2.811765e-06
##  5 6 2.400000e-06
##  5 7 2.400000e-06
##  5 8 2.800000e-06
##  6 7 2.400000e-06
##  6 8 2.826667e-06
##  7 8 2.857143e-06
##
##
## 1 - alpha = 0.95 two-sided CI for beta:
## 0, 0
```

```r
# calculate the median of the slopes
median(c(1.280000e-05,
6.800000e-06,
1.293333e-05,
1.045000e-05,
8.840000e-06,
7.766667e-06,
4.330000e-06,
8.000000e-07,
1.300000e-05,
9.666667e-06,
7.850000e-06,
6.760000e-06,
3.884211e-06,
2.520000e-05,
1.410000e-05,
1.020000e-05,
8.250000e-06,
4.055556e-06,
3.000000e-06,
2.700000e-06,
2.600000e-06,
2.811765e-06,
2.400000e-06,
2.400000e-06,
2.800000e-06,
2.400000e-06,
2.826667e-06,
2.857143e-06))
```

```
## [1] 5.545e-06
```

P460 Q13

```
X = c(0,5000,10000,15000,20000,25000,30000,100000)
Y = c(0.924,0.988,0.992,1.118,1.133,1.145,1.157,1.357)
summary(lm(Y~X))
```

```
##
## Call:
## lm(formula = Y ~ X)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -0.077517 -0.038910  0.002531  0.047584  0.057810
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) 1.002e+00  2.730e-02  36.689 2.74e-08 ***
## X           3.911e-06  6.969e-07   5.613  0.00136 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0584 on 6 degrees of freedom
## Multiple R-squared:   0.84,  Adjusted R-squared:  0.8134
## F-statistic: 31.51 on 1 and 6 DF,  p-value: 0.001365
```

P460 Q7

```
X = c(0,5000,10000,15000,20000,25000,30000,100000)
Y = c(0.924,0.988,0.992,1.118,1.133,1.145,1.157,1.357)
confint(lm(Y~X), level = 0.9)
```

```
##                       5 %         95 %
## (Intercept) 9.484733e-01 1.054561e+00
## X           2.557368e-06 5.265685e-06
```