M440B HW 11

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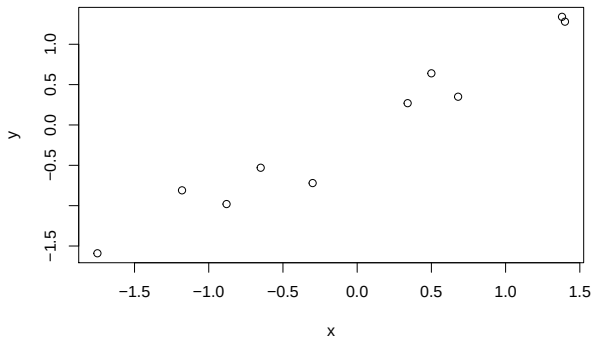
Problem 1: This problem was done on a separate piece of paper that will be submitted alongside this assignment.

Problem 2: I begin this problem by inputting and plotting the given data.

```
y = c(0.27,1.34,-0.53,0.35,1.28,-0.98,-0.72,-0.81,0.64,-1.59)
x = c(0.34,1.38,-0.65,0.68,1.40,-0.88,-0.30,-1.18,0.50,-1.75)
plot(x,y)
```



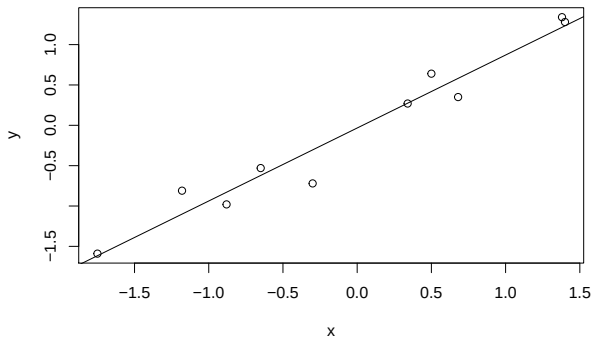
A. Fit a line $y = a + bx$ by method of LS and display the line on the plot.

```
mod1 = lm(y~x)
summary(mod1)
```

```
##
## Call:
## lm(formula = y ~ x)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.41528 -0.11406  0.03667  0.11680  0.29061
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) -0.03340    0.07159  -0.467    0.653
```

```
## x            0.90441    0.07008  12.905 1.23e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2261 on 8 degrees of freedom
## Multiple R-squared:  0.9542, Adjusted R-squared:  0.9484
## F-statistic: 166.5 on 1 and 8 DF,  p-value: 1.23e-06
```

```
plot(x,y)
abline(mod1)
```



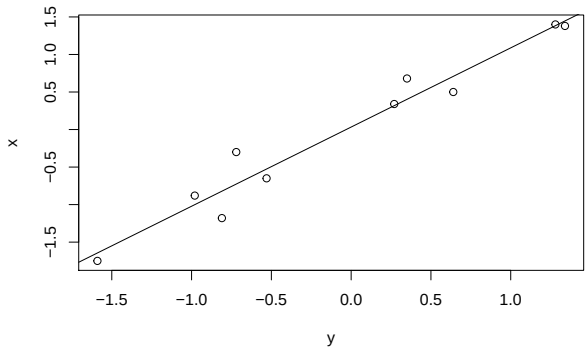
The above summary table output indicates that $a = -0.0334$ and $b = 0.90441$.

B. Fit a line $x = c + dy$ by method of LS and display the line on the plot.

```
mod2 = lm(x~y)
summary(mod2)
```

```
##
## Call:
## lm(formula = x ~ y)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.35857 -0.11939 -0.02519  0.09609  0.42648
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.03313    0.07748   0.428     0.68
## y            1.05501    0.08175  12.905 1.23e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2443 on 8 degrees of freedom
## Multiple R-squared:  0.9542, Adjusted R-squared:  0.9484
## F-statistic: 166.5 on 1 and 8 DF,  p-value: 1.23e-06
```

```
plot(y,x)
abline(mod2)
```



The above output indicates that $c = 0.03313$ and $d = 1.05501$. In this case, y is being used to predict values of x.

C. Are the lines the same? No they are not. This is to be expected because the variables were swapped in parts A and B. That is, x was a predictor for y in part A, while y was a predictor for x in part B.

Problem 15: This problem was done on a separate piece of paper that will be submitted alongside this assignment.