Fixed effects test

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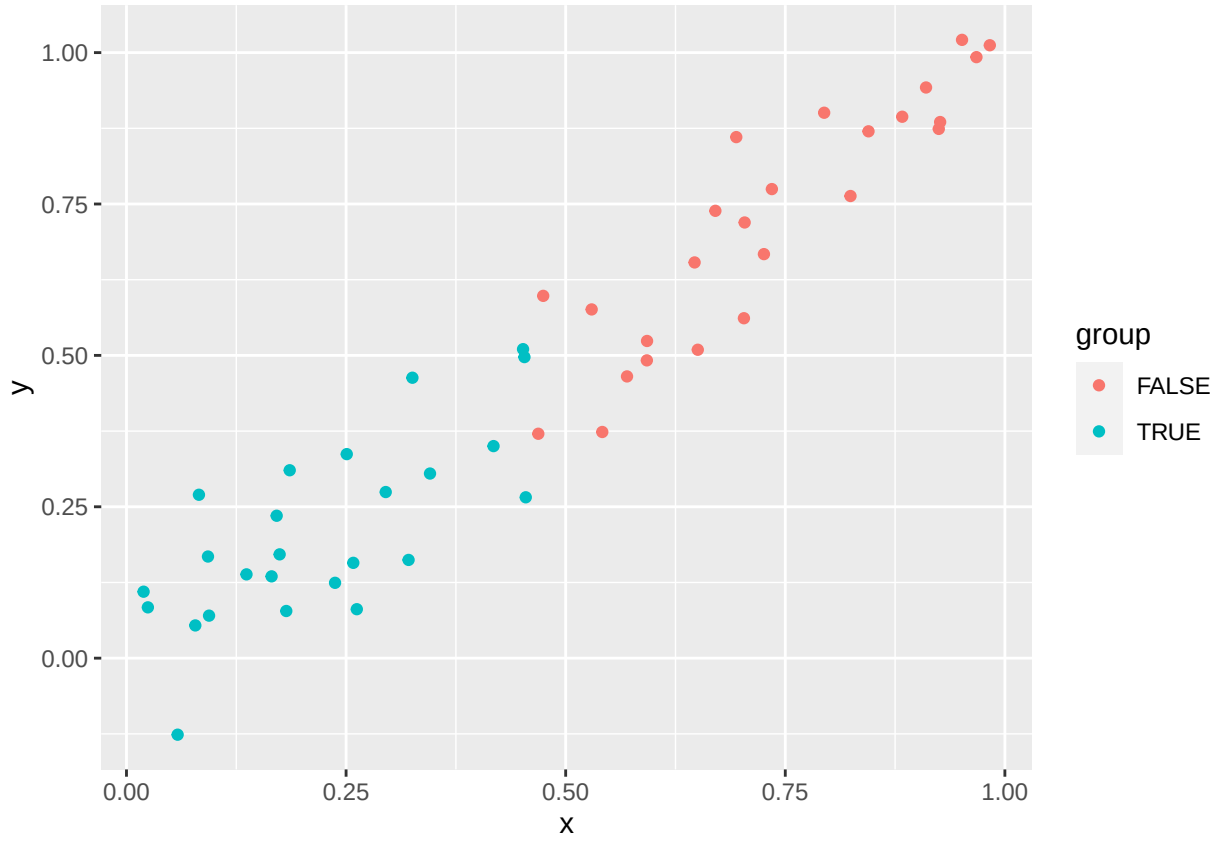
Create data

```
test <- data.frame(x = runif(n = 50))
test$y <- test$x + rnorm(n = 50, mean = 0, sd = 0.1)
test$group <- test$x<=median(test$x)
ggplot(test, aes(x = x, y = y, color = group)) +
  geom_point()
```

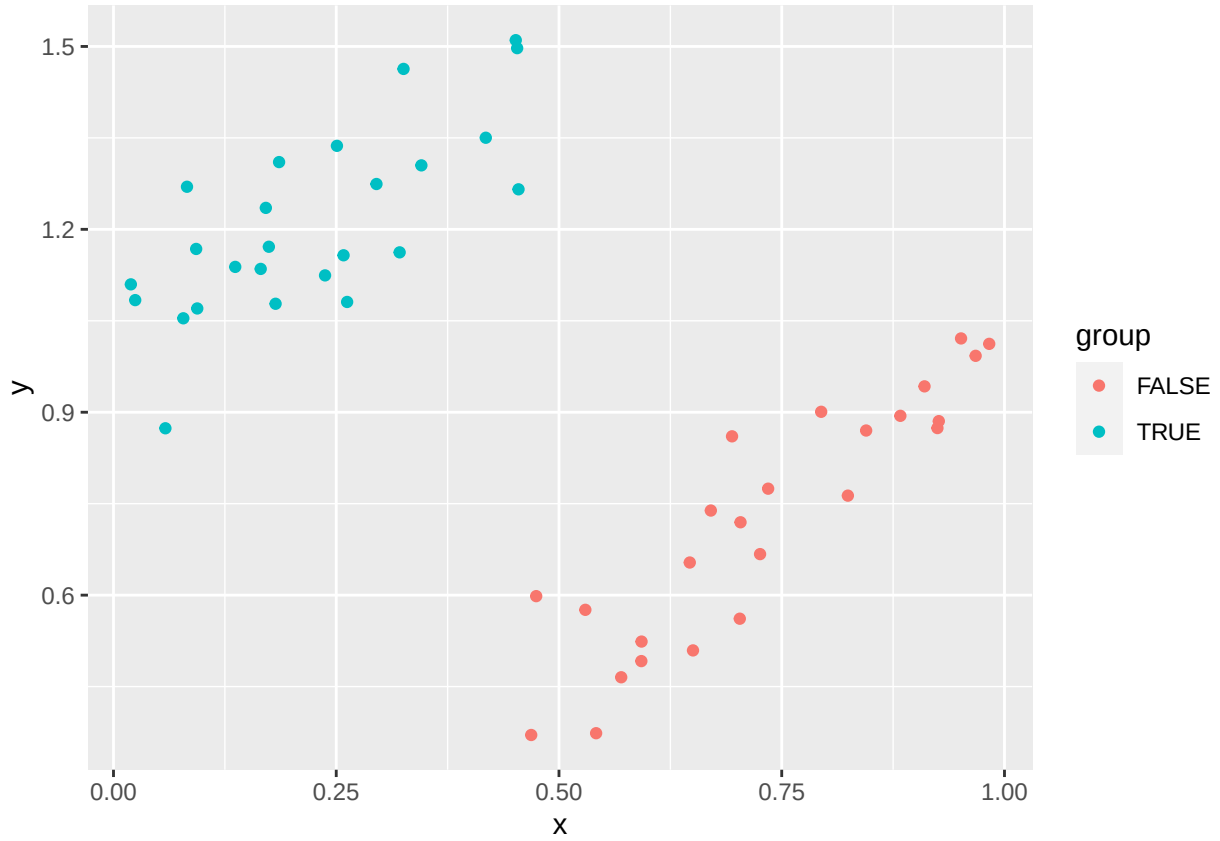


Regress

```
mod <- lm(y ~ x + factor(group), test)
summary(mod)
```

```
##
## Call:
## lm(formula = y ~ x + factor(group), data = test)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.17662 -0.07995  0.01195  0.07193  0.19997
##
## Coefficients:
##                     Estimate Std. Error t value Pr(>|t|)
## (Intercept)       -0.011358   0.072527  -0.157    0.876
## x                  1.000872   0.095335  10.498 6.51e-14 ***
## factor(group)TRUE -0.001325   0.056067  -0.024    0.981
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.09824 on 47 degrees of freedom
## Multiple R-squared:  0.9055, Adjusted R-squared:  0.9015
## F-statistic: 225.2 on 2 and 47 DF,  p-value: < 2.2e-16
```

```
test2 <- mutate(test, y = y + group)
ggplot(test2, aes(x = x, y = y, color = group)) +
  geom_point()
```

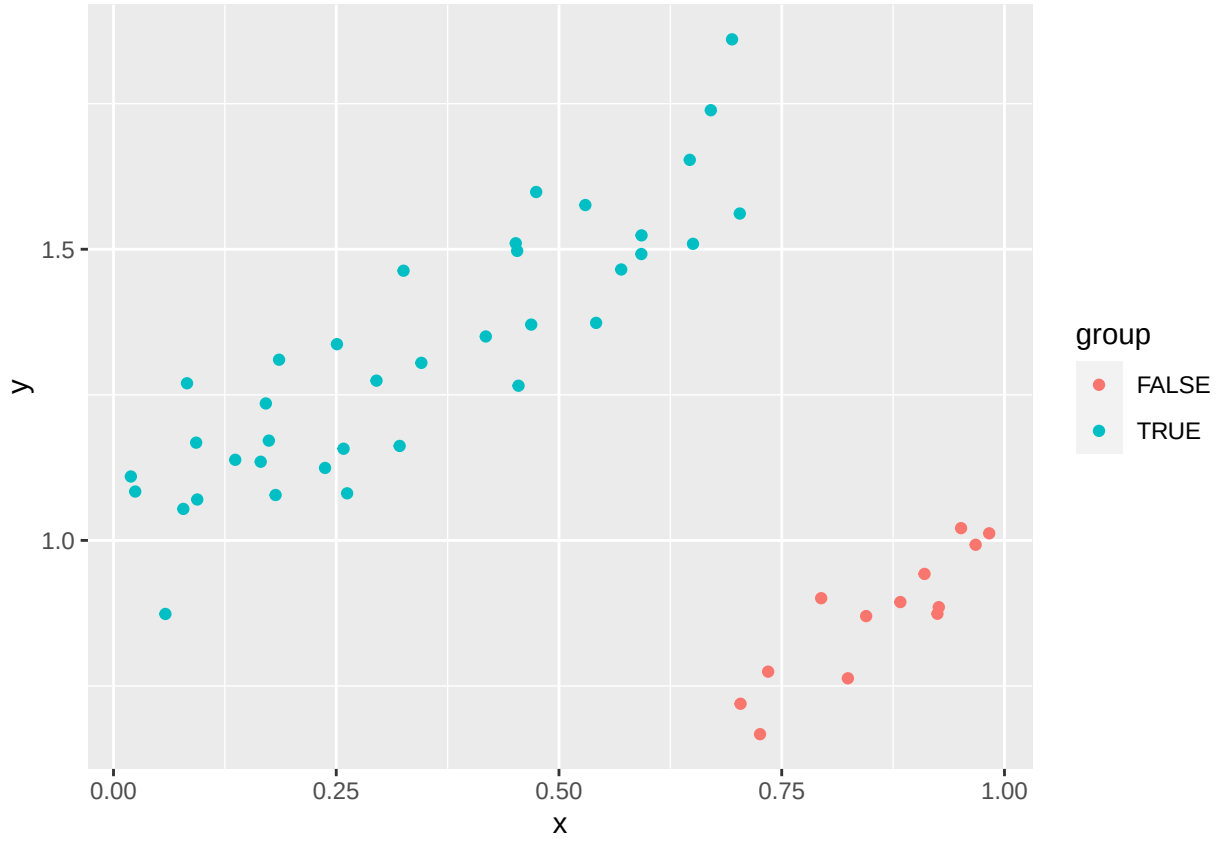


```r
mod <- lm(y ~ x + factor(group), test2)
summary(mod)
```

```
##
## Call:
## lm(formula = y ~ x + factor(group), data = test2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.17662 -0.07995  0.01195  0.07193  0.19997
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)       -0.01136    0.07253  -0.157    0.876
## x                  1.00087    0.09533  10.498 6.51e-14 ***
## factor(group)TRUE  0.99868    0.05607  17.812  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.09824 on 47 degrees of freedom
## Multiple R-squared:  0.8989, Adjusted R-squared:  0.8946
## F-statistic:   209 on 2 and 47 DF,  p-value: < 2.2e-16
```

```r
test3 <- mutate(test,
                group = x<=quantile(test$x, 0.75),
                y = y+group)

ggplot(test3, aes(x = x, y = y, color = group)) +
  geom_point()
```




```
mod <- lm(y ~ x + factor(group), test3)
summary(mod)
```

```
##
## Call:
## lm(formula = y ~ x + factor(group), data = test3)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -0.187721 -0.068140 -0.001591  0.071917  0.213904
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)        0.07969    0.06781   1.175    0.246
## x                  0.92012    0.07256  12.681   <2e-16 ***
## factor(group)TRUE  0.92811    0.04864  19.080   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.09604 on 47 degrees of freedom
## Multiple R-squared:  0.8884, Adjusted R-squared:  0.8837
## F-statistic: 187.1 on 2 and 47 DF,  p-value: < 2.2e-16
```