Stat 580 Final Project Animation RMS

2023-12-04

```
rms = function(x, y, h){
  ys = 0
  xs = seq(min(x), max(x), length = 50)
  for(i in 1:length(xs)){

    ys[i] = mean(y[(x>xs[i]-h)&(x<xs[i]+h)])

  }
  list(y=ys, x=xs)
}
```

```
data = read.csv("~/Documents/SDSU /Stat580/FinalProject/Global_Education.csv", header=TRUE)

math = data[,21]

birth = data[,26]

n = length(birth)

df = data.frame(math=math, birth=birth)

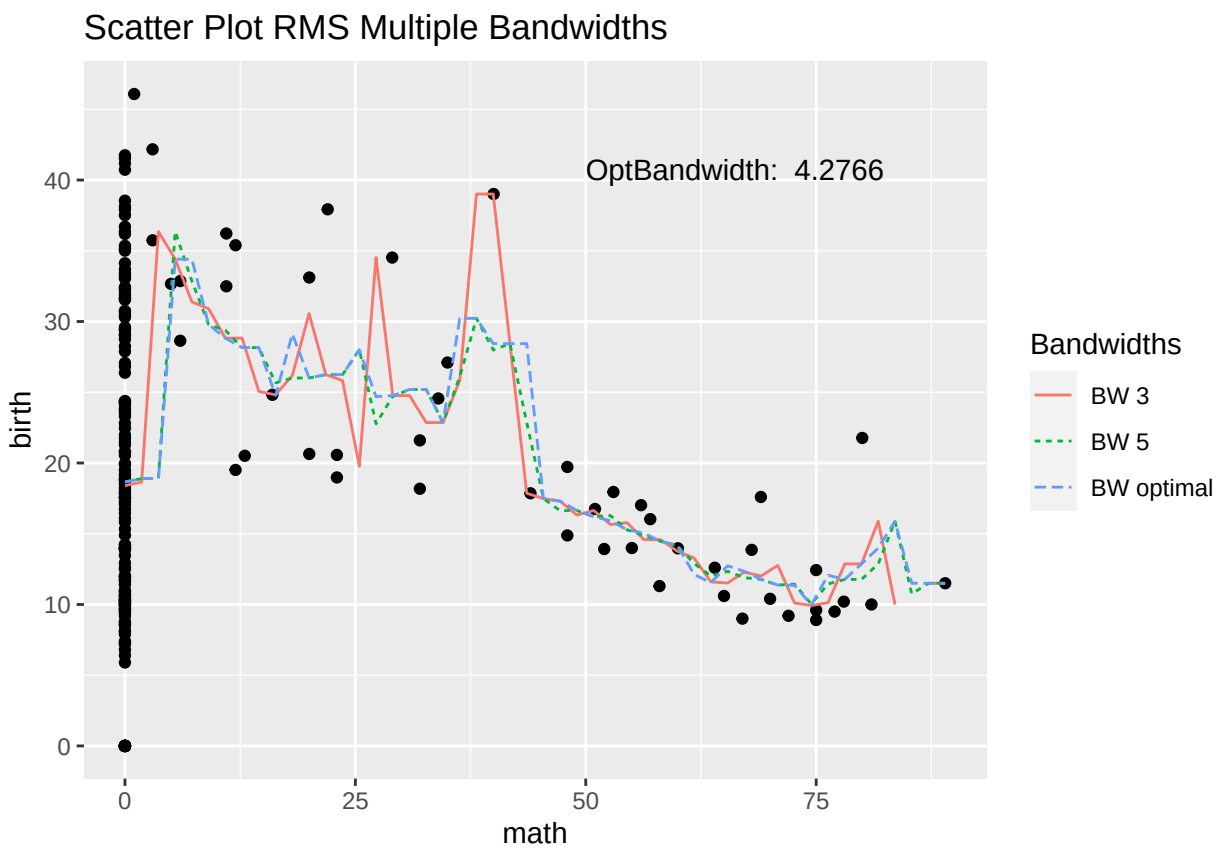
optimalbw = dpill(math, birth)


rms_3 = rms(math, birth, 3)
rms_5 = rms(math, birth, 5)
rms_best = rms(math, birth, optimalbw)



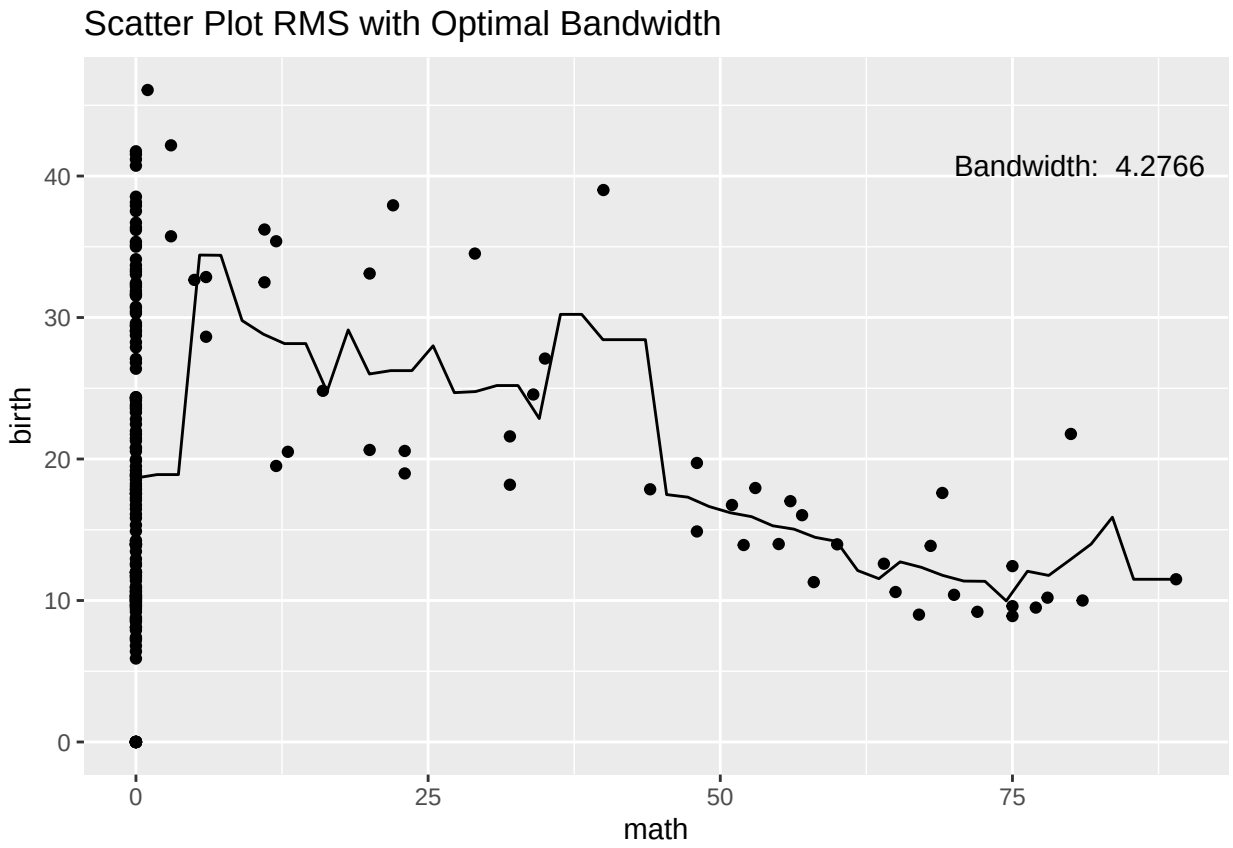
x = c(rms_3$x, rms_5$x, rms_best$x)
y = c(rms_3$y, rms_5$y, rms_best$y)
group = as.factor(c(rep("BW 3", 50), rep("BW 5", 50), rep("BW optimal", 50)))
vizdata = data.frame(x=x, y=y, Bandwidths=group)

ggplot() +
  geom_point(data=df, aes(x=math, y=birth)) +
  geom_line(data=vizdata, aes(x=x, y=y, color=Bandwidths, linetype = Bandwidths) )+
  annotate("text", x = 50, y = 40, label = paste("OptBandwidth: ", round(optimalbw, 4)), hjust = 0, vjus
  ggtitle("Scatter Plot RMS Multiple Bandwidths")
```




```
vizdata2 = data.frame(x=rms_best$x, y=rms_best$y)

ggplot() +
  geom_point(data=df, aes(x=math, y=birth)) +
  geom_line(data=vizdata2, aes(x=x, y=y) ) +
  annotate("text", x = 70, y = 40, label = paste("Bandwidth: ", round(optimalbw, 4)), hjust = 0, vjust =
  ggtitle("Scatter Plot RMS with Optimal Bandwidth")
```




```
nonzero_pairs = math != 0 & birth != 0

filtered_math = math[nonzero_pairs]
filtered_birth = birth[nonzero_pairs]

filtered_math
```

```
##  [1] 11 56 55 64 32 11 16 52 75 22 40 12  3 75 48  6 60  3 67 12 48 58 77 34 32
## [26] 75 44 80 35 81  5 78 69  6 20  1 70 23 23 53 89 29 72 65 13 20 57 68 51
```

```
filtered_birth
```

```
##  [1] 32.49 17.02 13.99 12.60 18.18 36.22 24.82 13.92  8.90 37.93 39.01 35.39
## [13] 42.17 12.43 14.88 32.86 13.97 35.74  9.00 19.51 19.72 11.30  9.50 24.56
## [25] 21.60  9.60 17.86 21.77 27.10 10.00 32.66 10.20 17.60 28.64 20.64 46.08
## [37] 10.40 18.98 20.57 17.95 11.50 34.52  9.20 10.60 20.51 33.11 16.03 13.86
## [49] 16.75
```

```
n = length(filtered_birth)

df = data.frame(math=filtered_math, birth=filtered_birth)

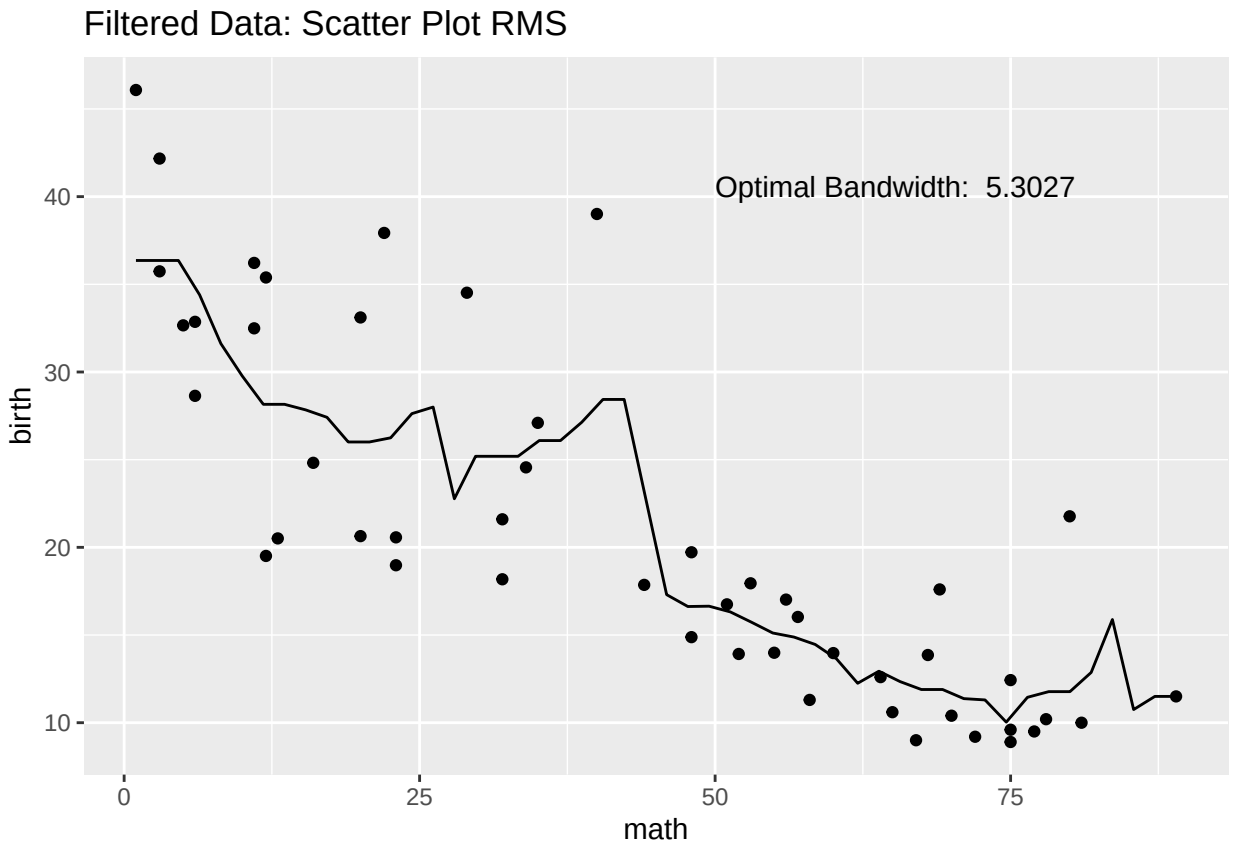
optimalbw = dpill(filtered_math, filtered_birth)

rms_best = rms(filtered_math, filtered_birth, optimalbw)

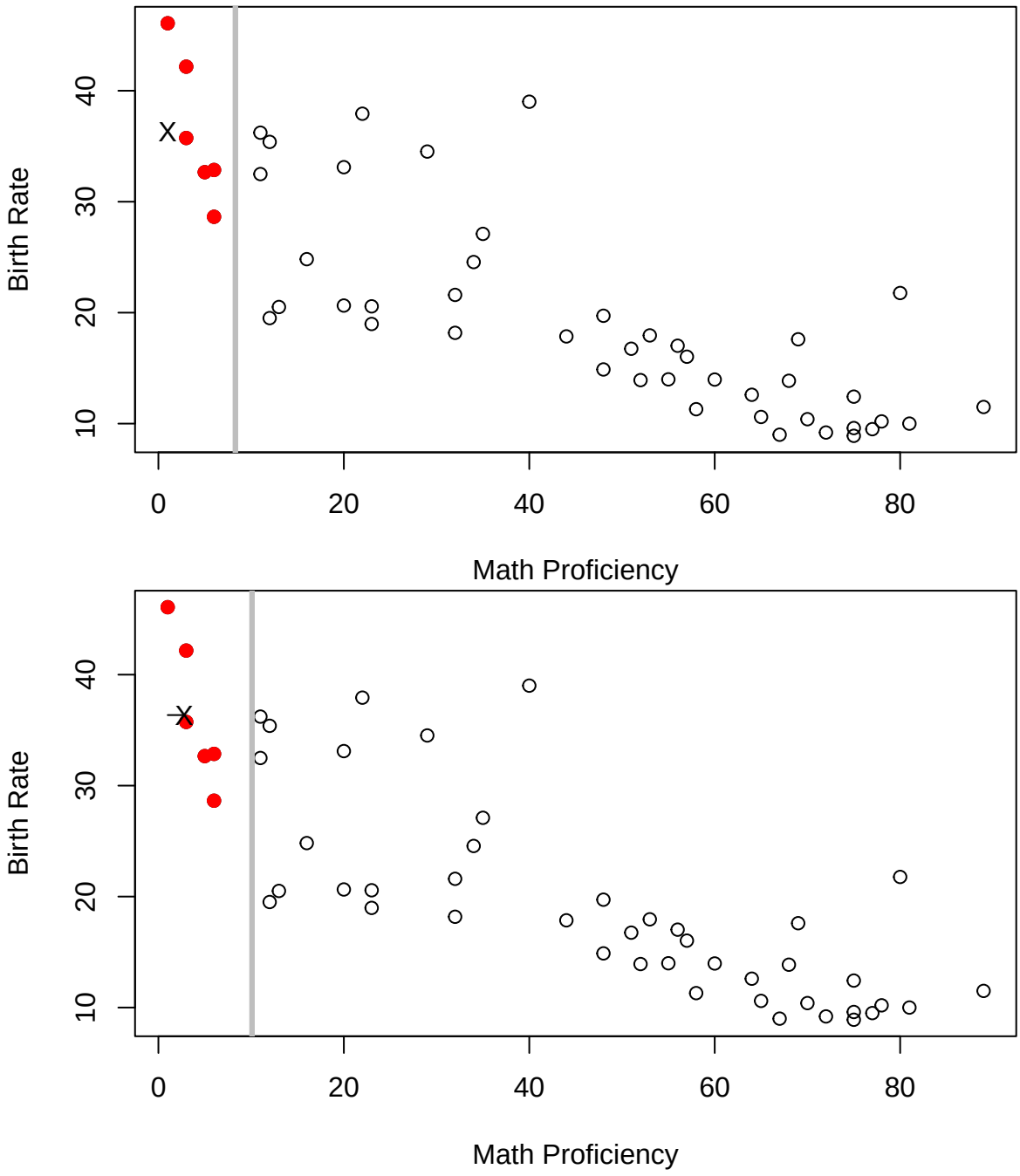
vizdata3 = data.frame(x=rms_best$x, y=rms_best$y)

ggplot() +
```

```
  geom_point(data=df, aes(x=math, y=birth)) +
  geom_line(data=vizdata3, aes(x=x, y=y) ) +
  annotate("text", x = 50, y = 40, label = paste("Optimal Bandwidth: ", round(optimalbw, 4)), hjust = 0
  ggtitle("Filtered Data: Scatter Plot RMS")
```




```
source("rmsani.R") # rms function to create animation frames
# set time interval (in seconds) and number of frames for the animation
oopt = ani.options(interval = 0.25, nmax = 50)
# function creating smooth in each neighborhood of 50 equally-spaced points
rmsfit = rmsani(filtered_math,filtered_birth,optimalbw,1)
```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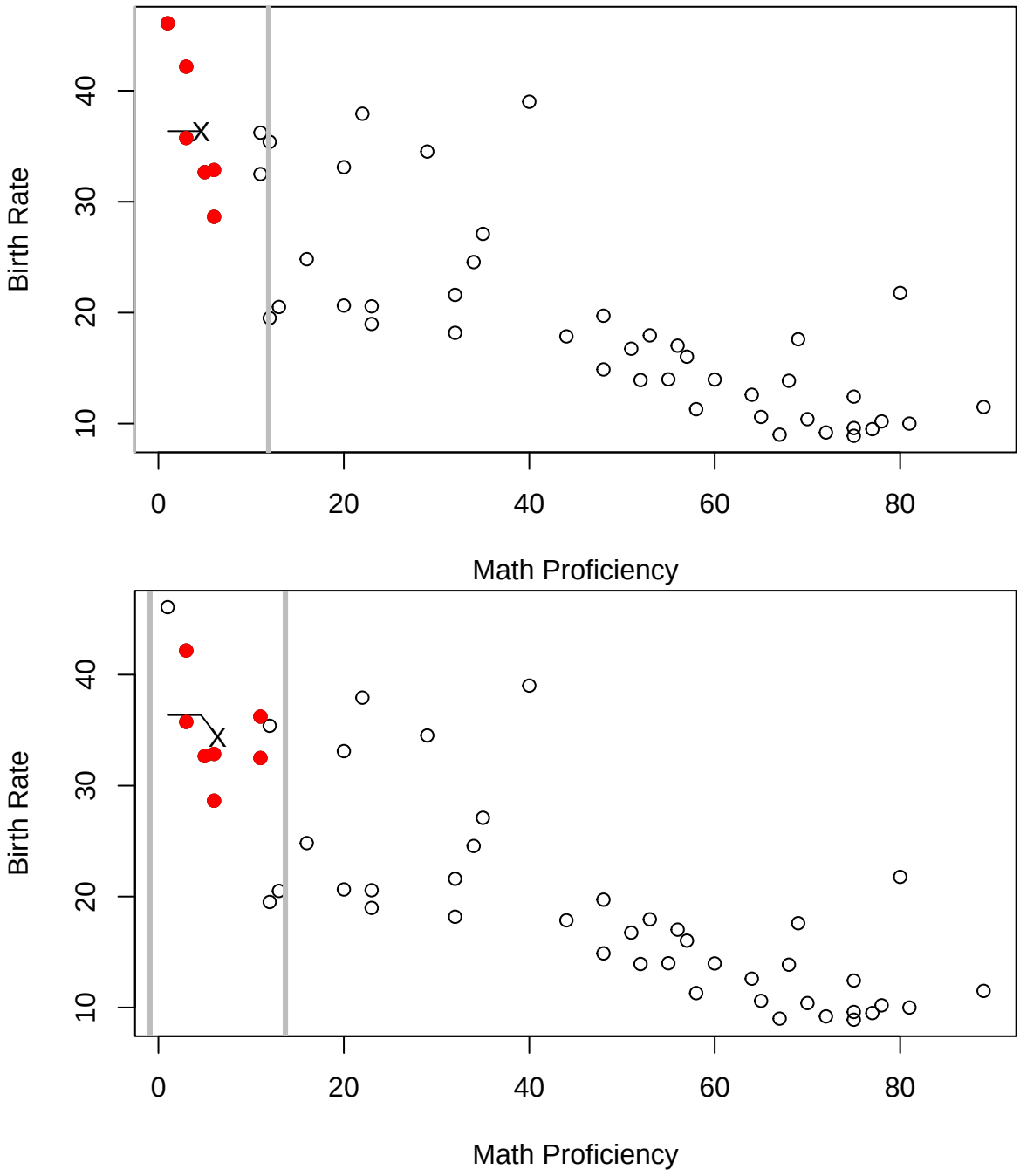
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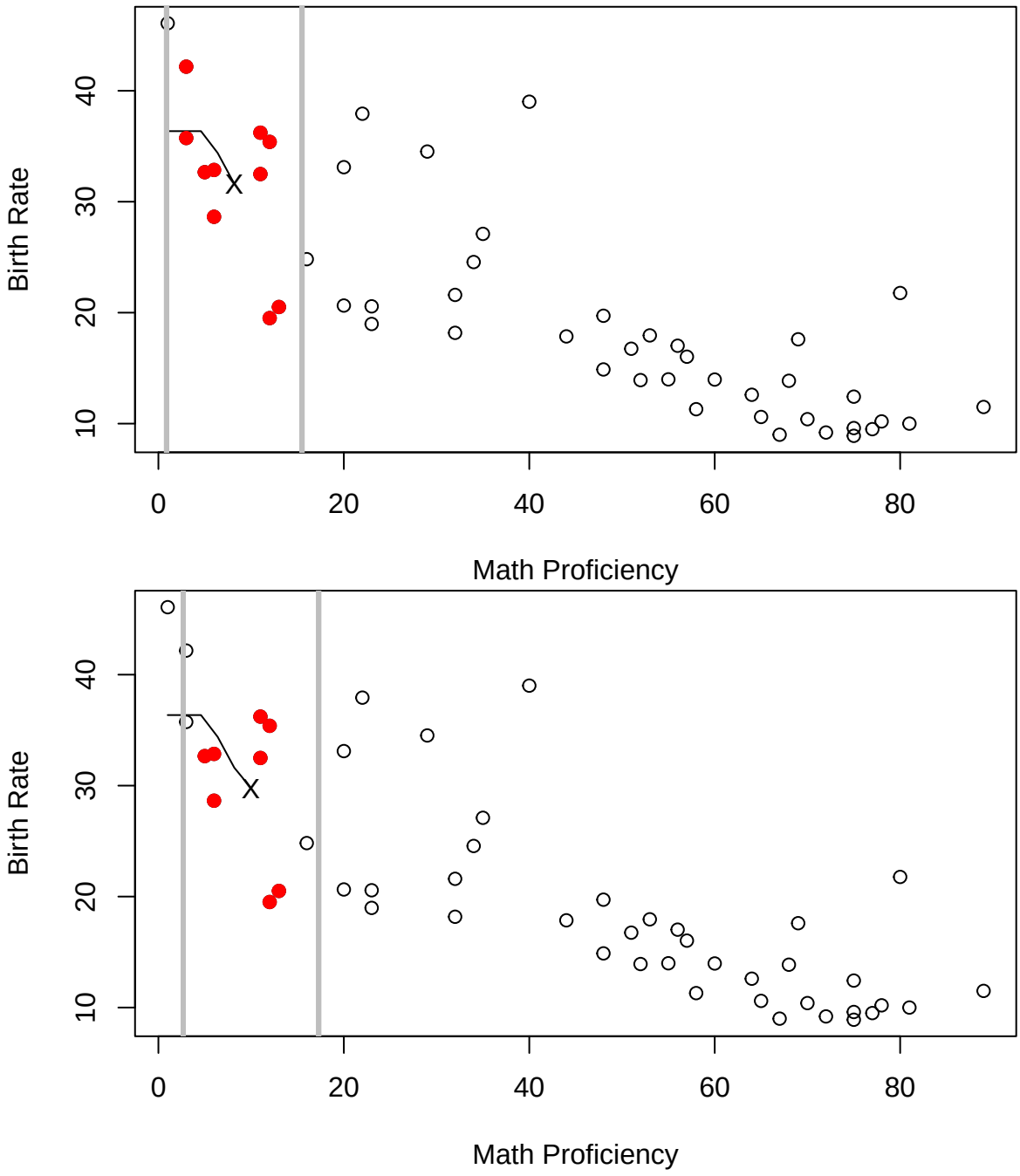
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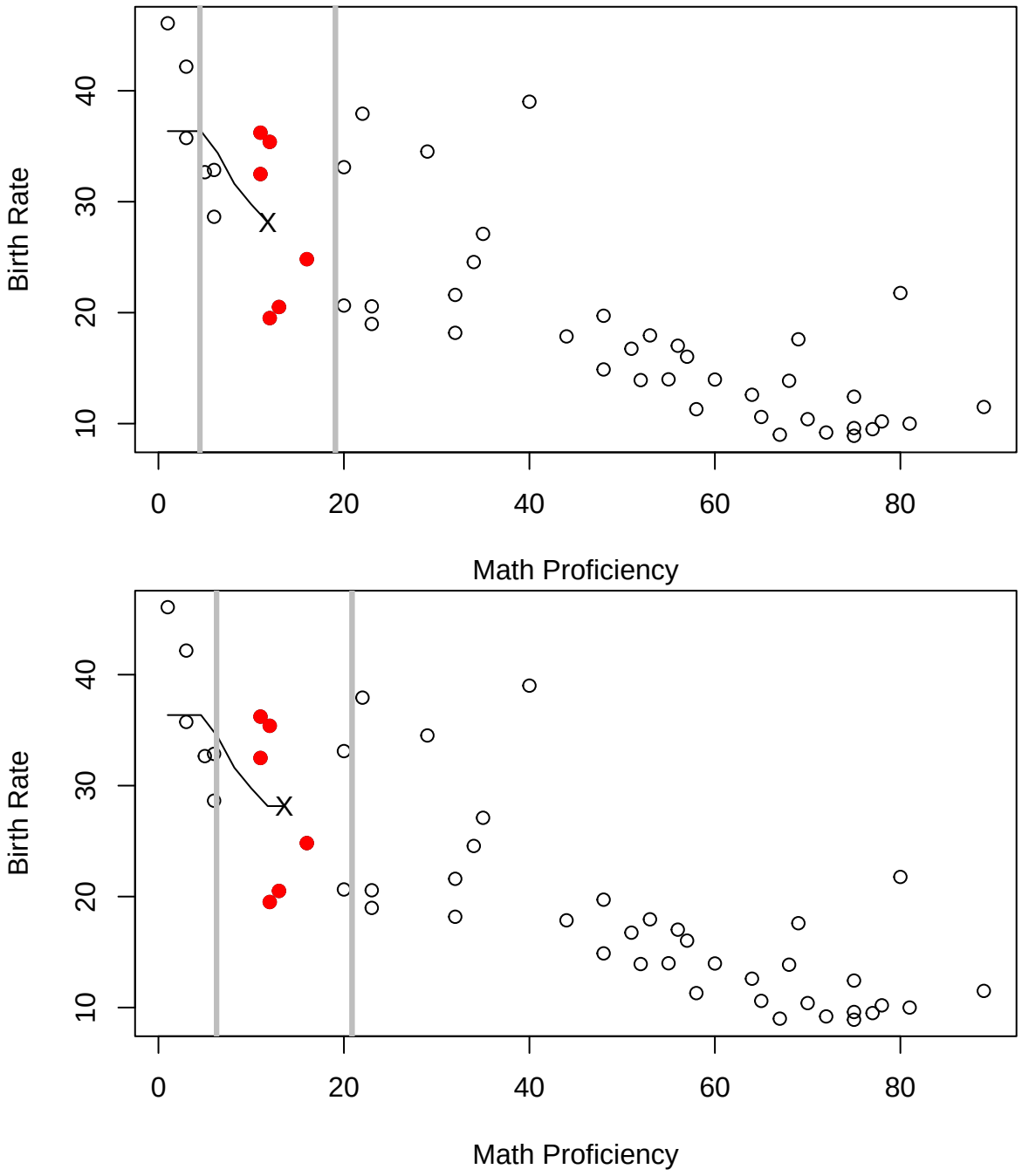
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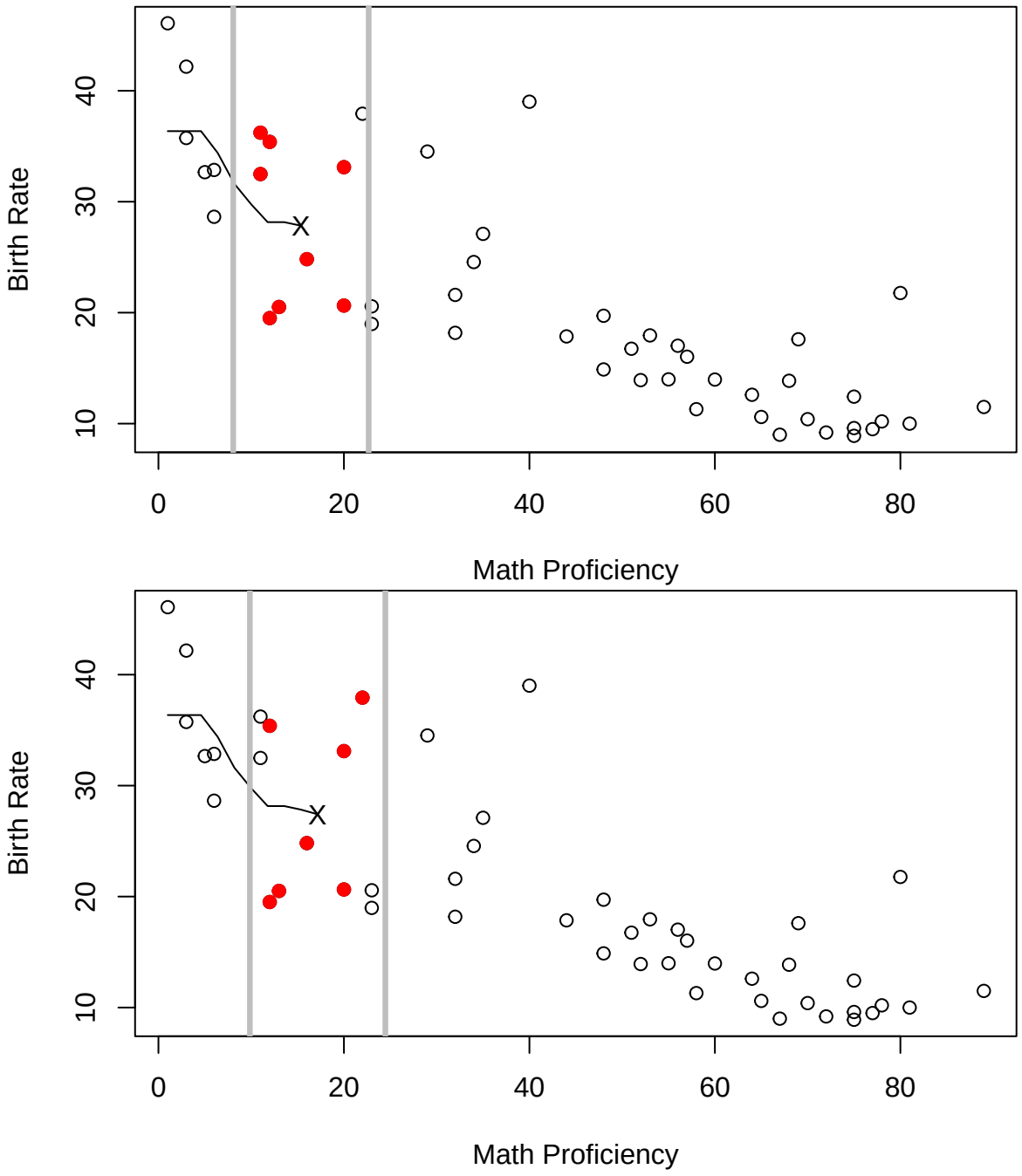
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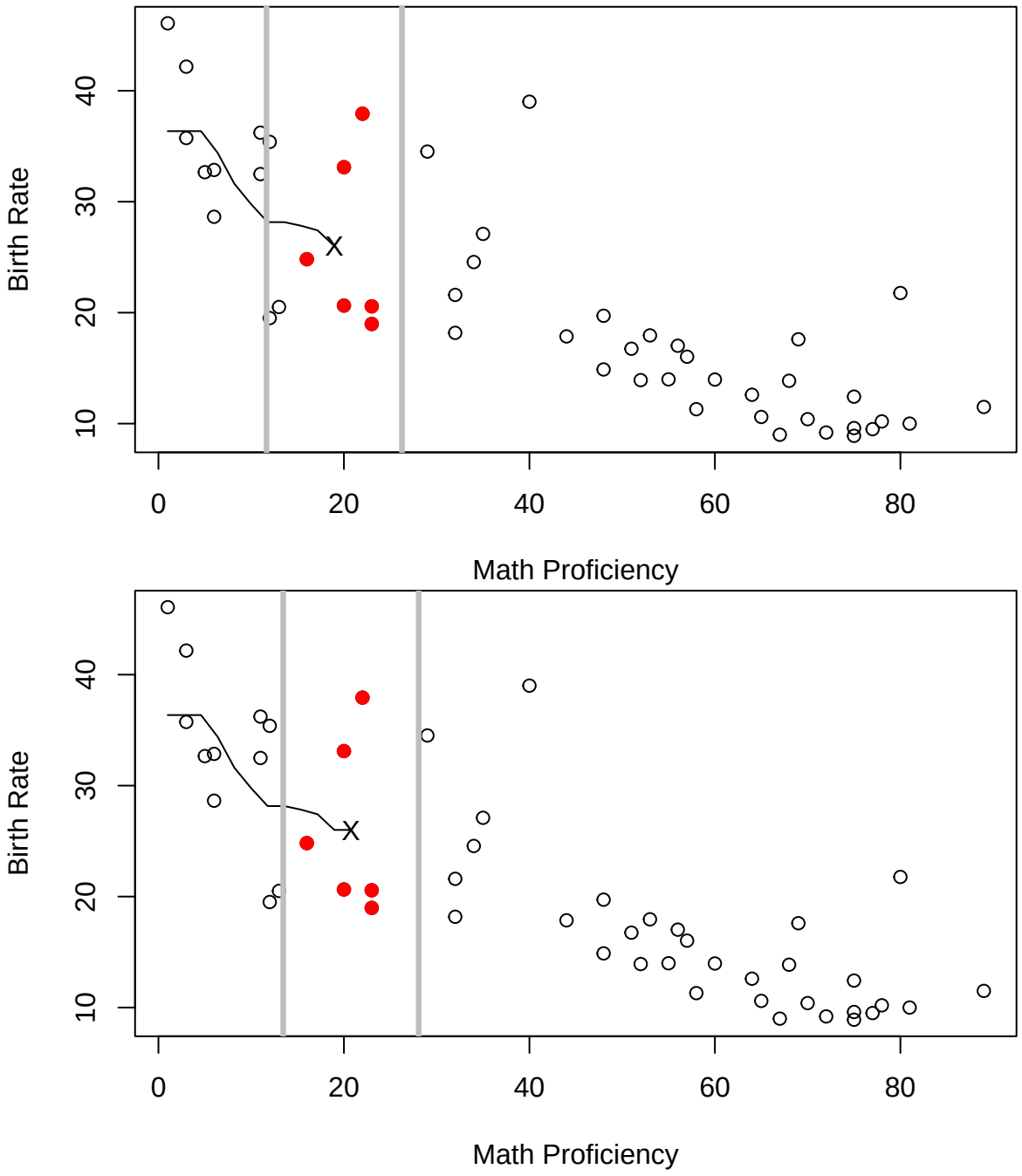
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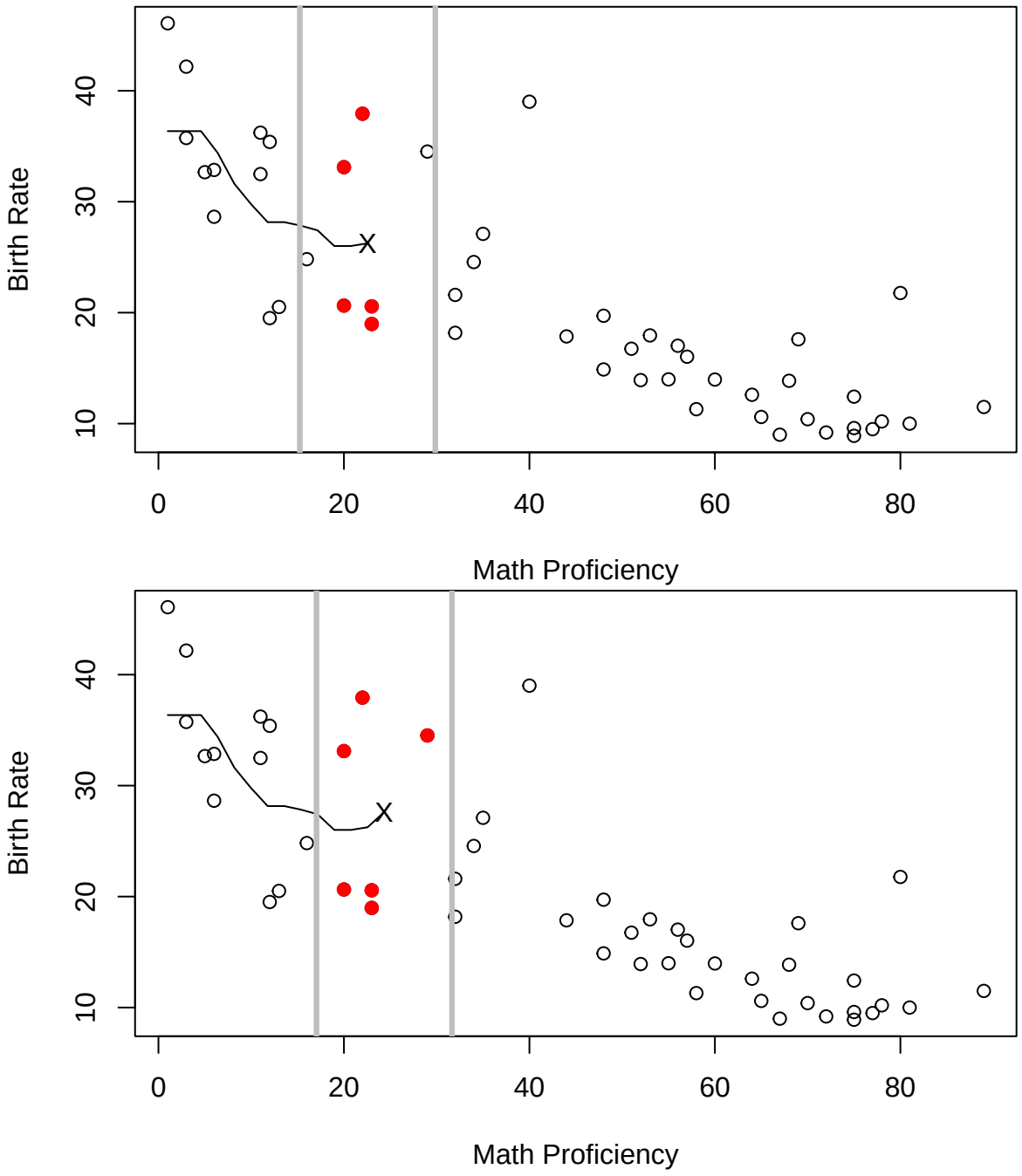
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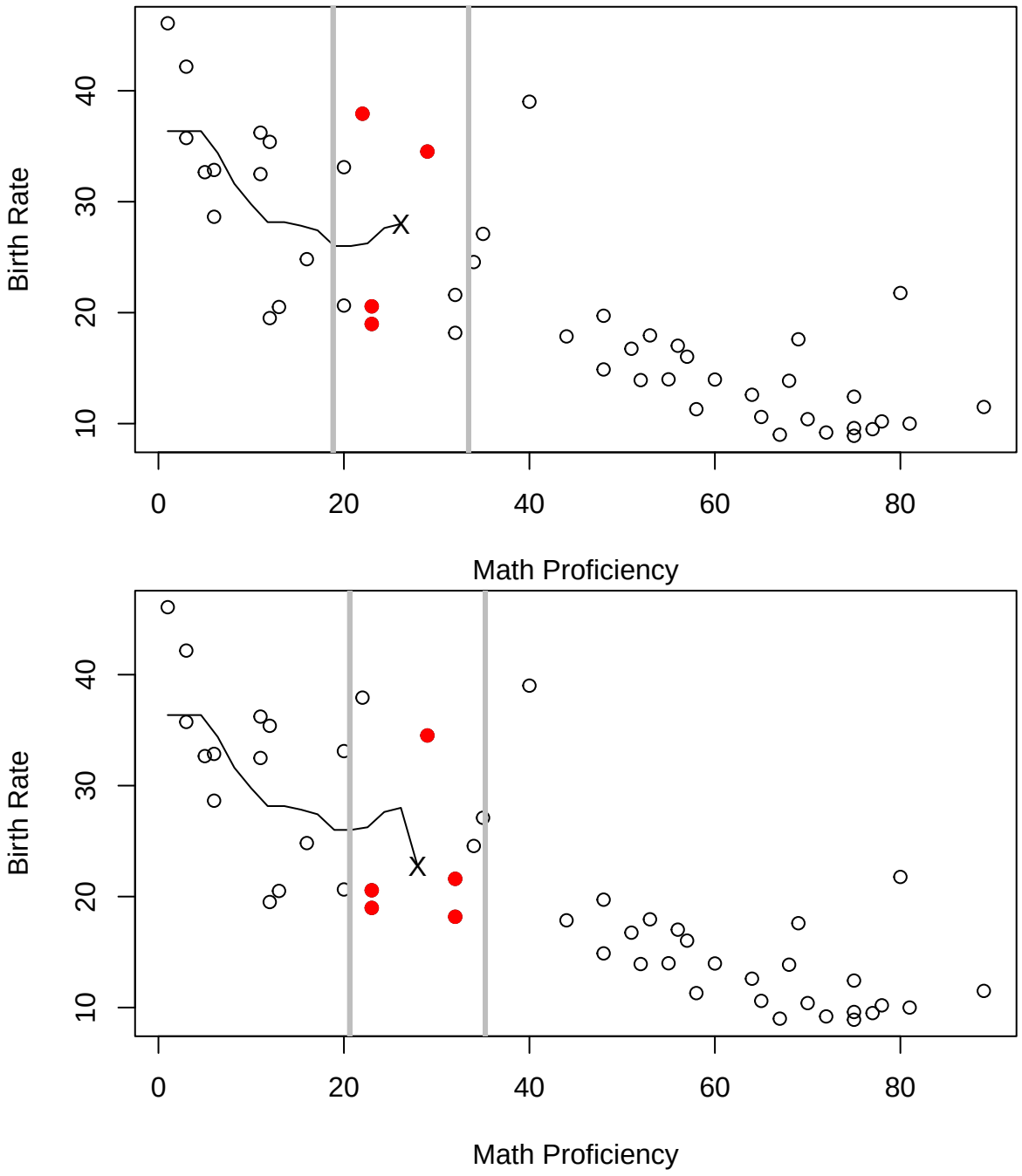
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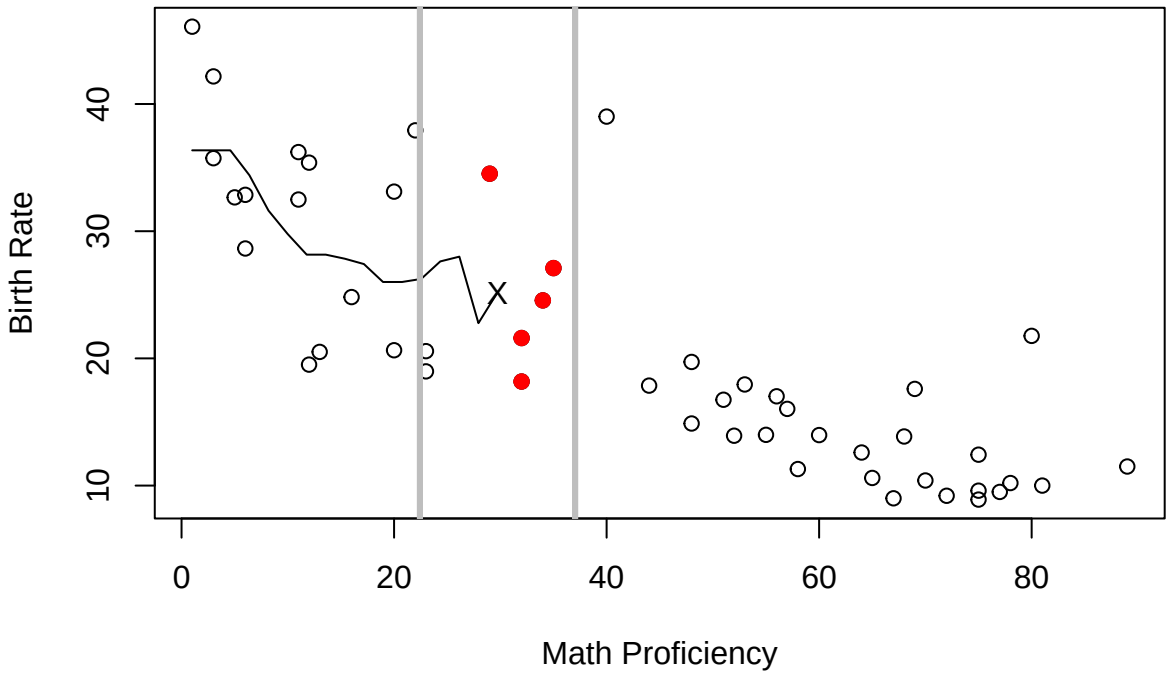
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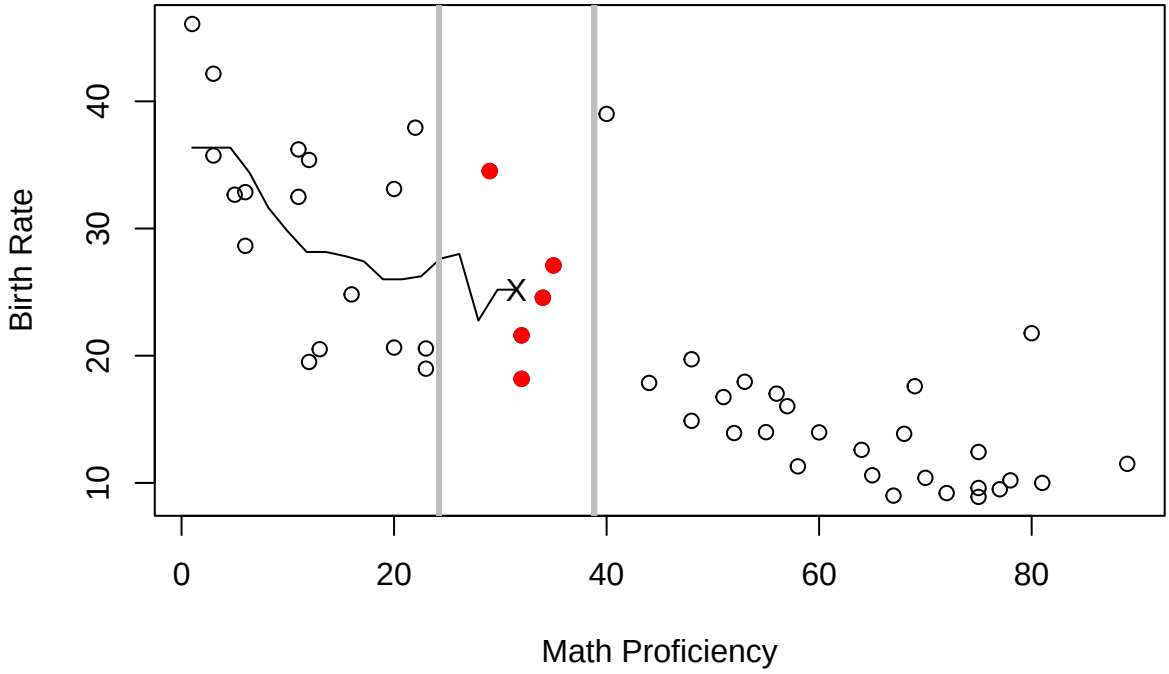
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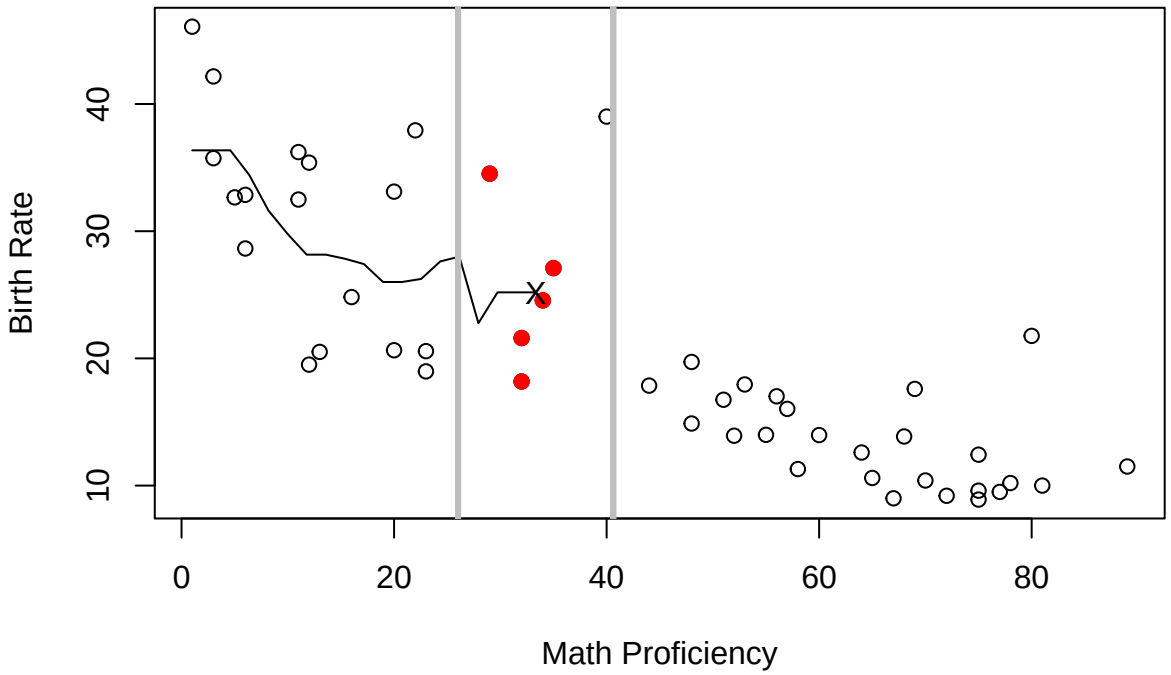
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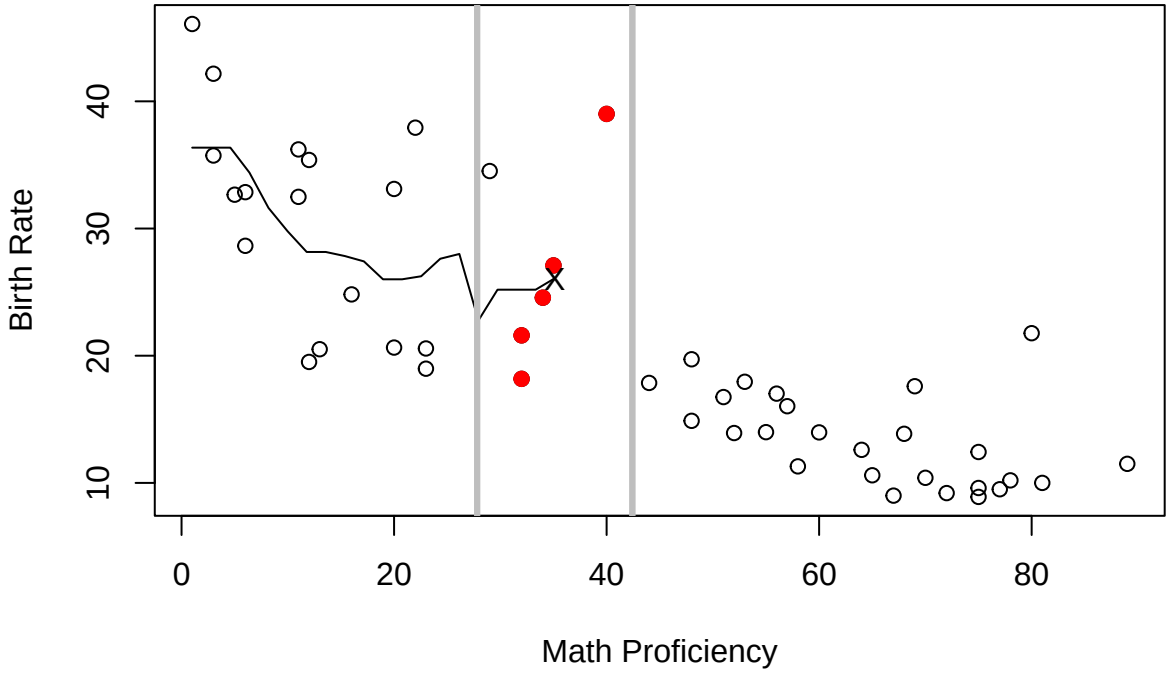
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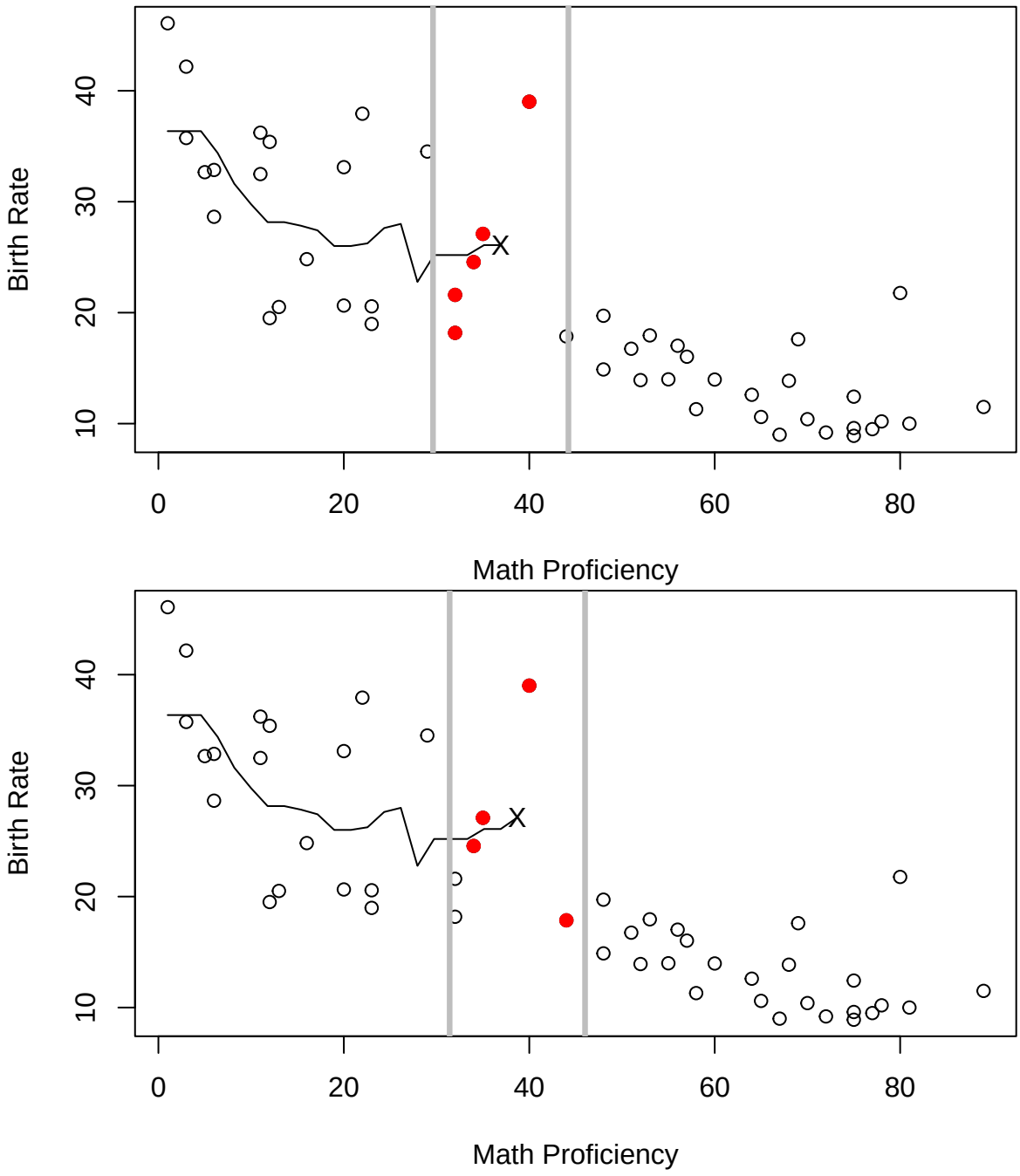
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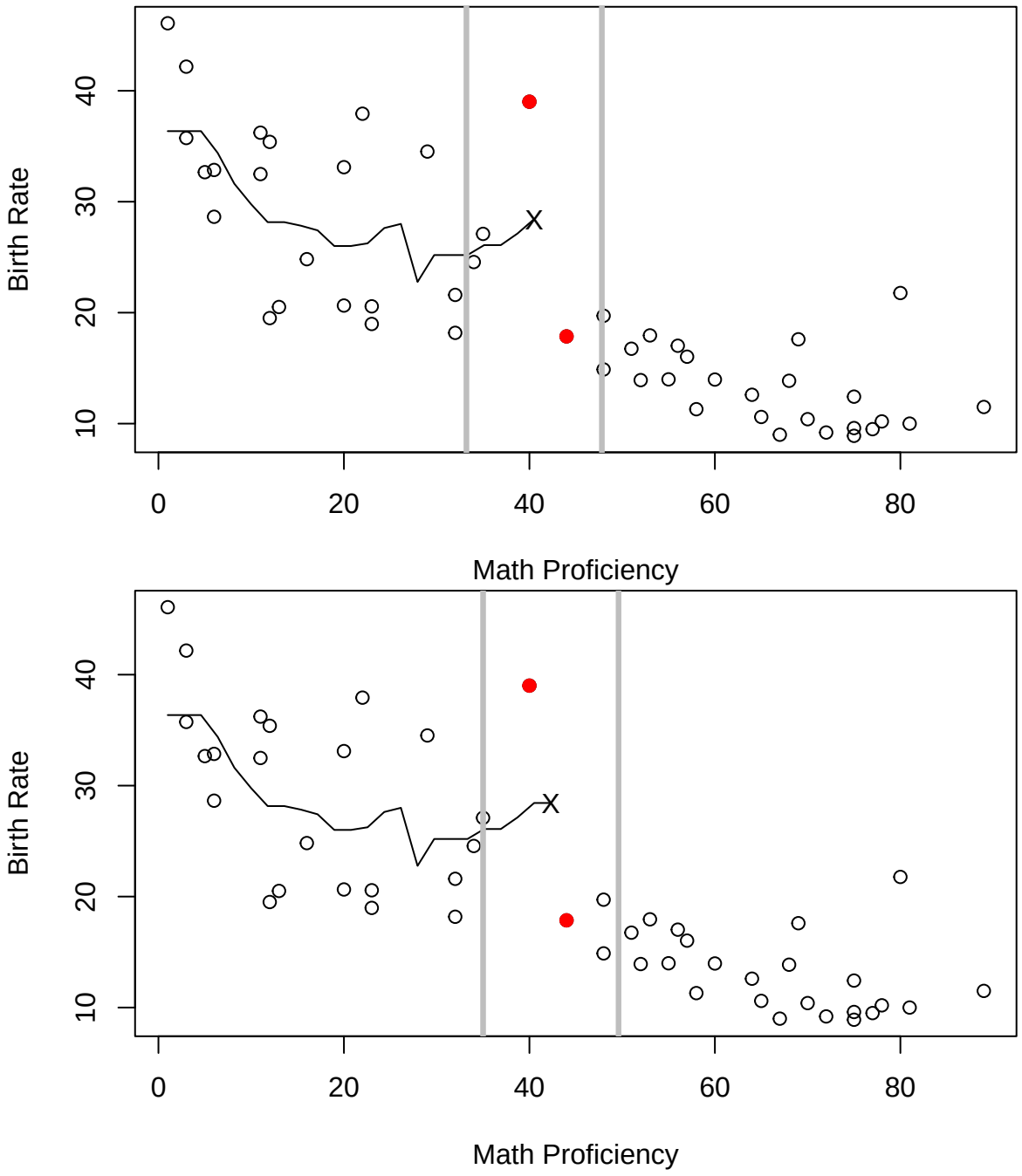
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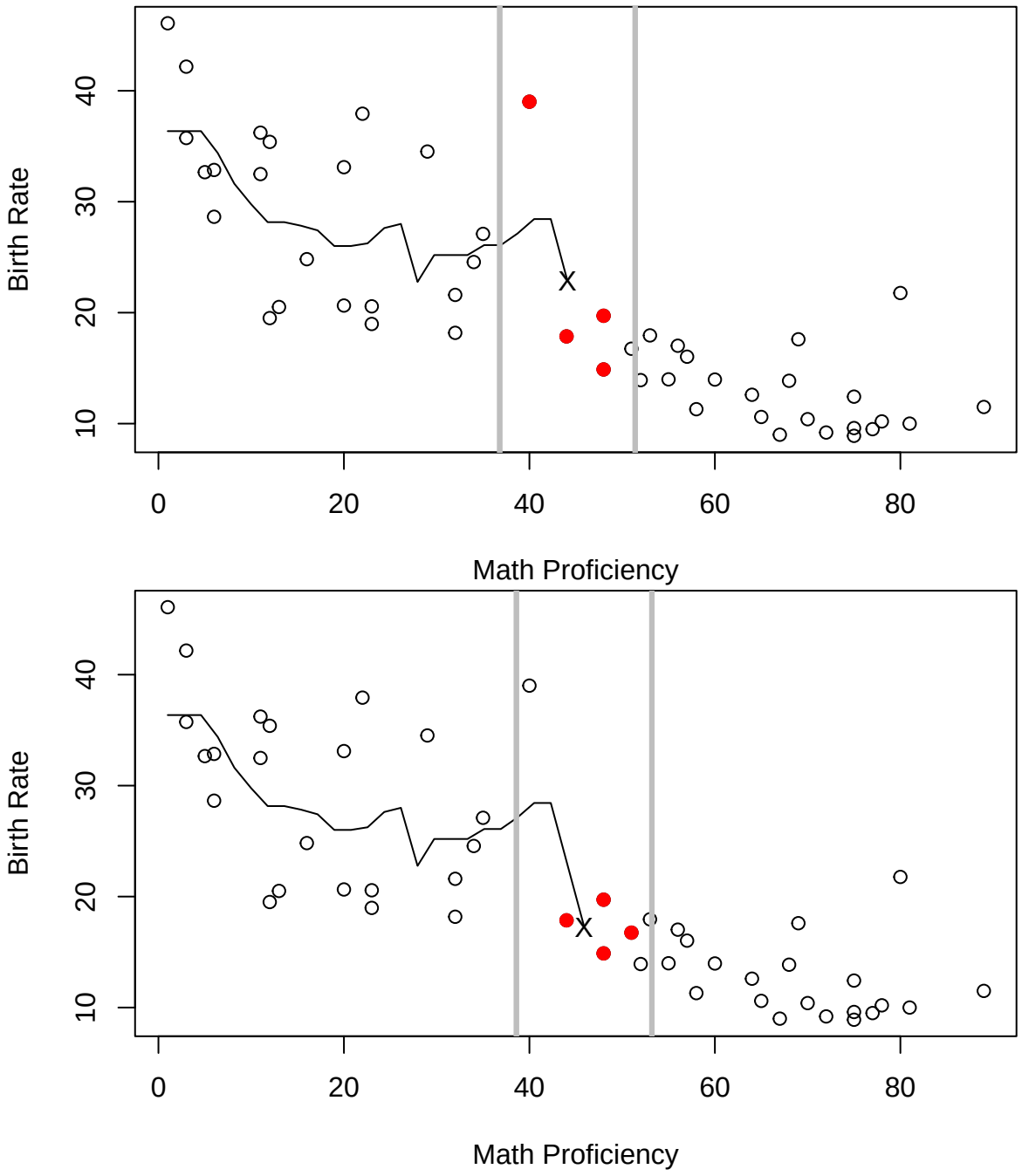
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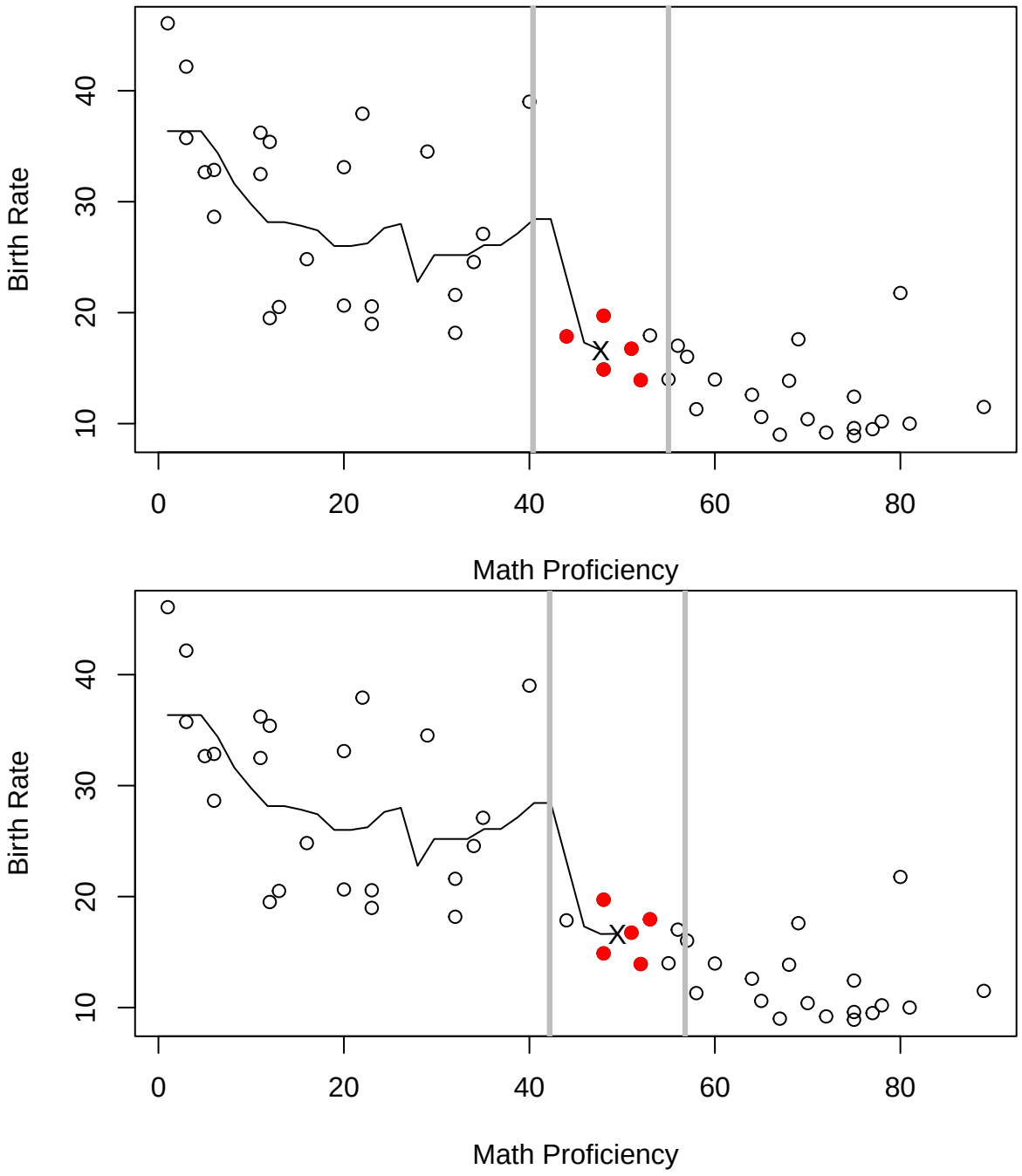
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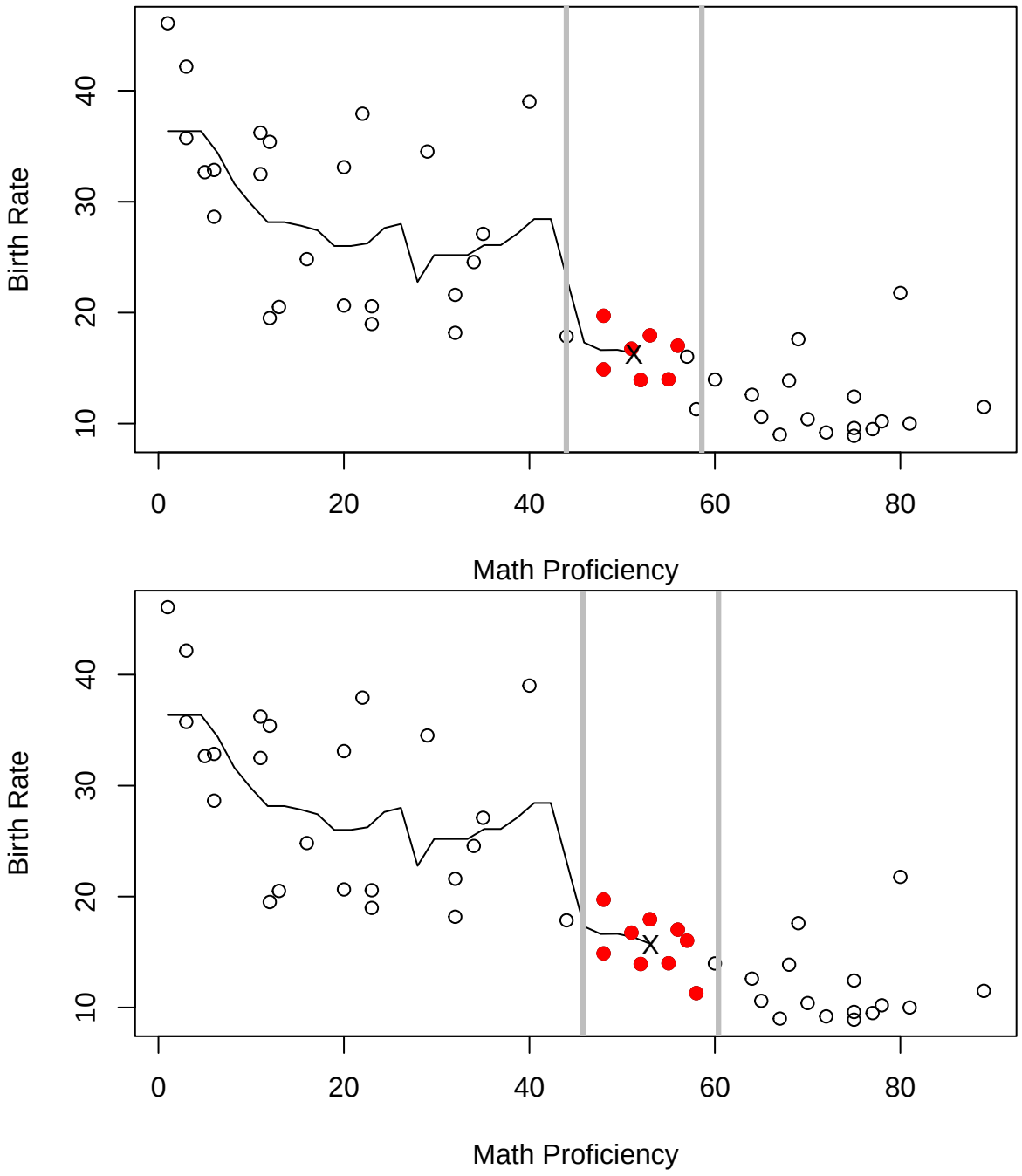
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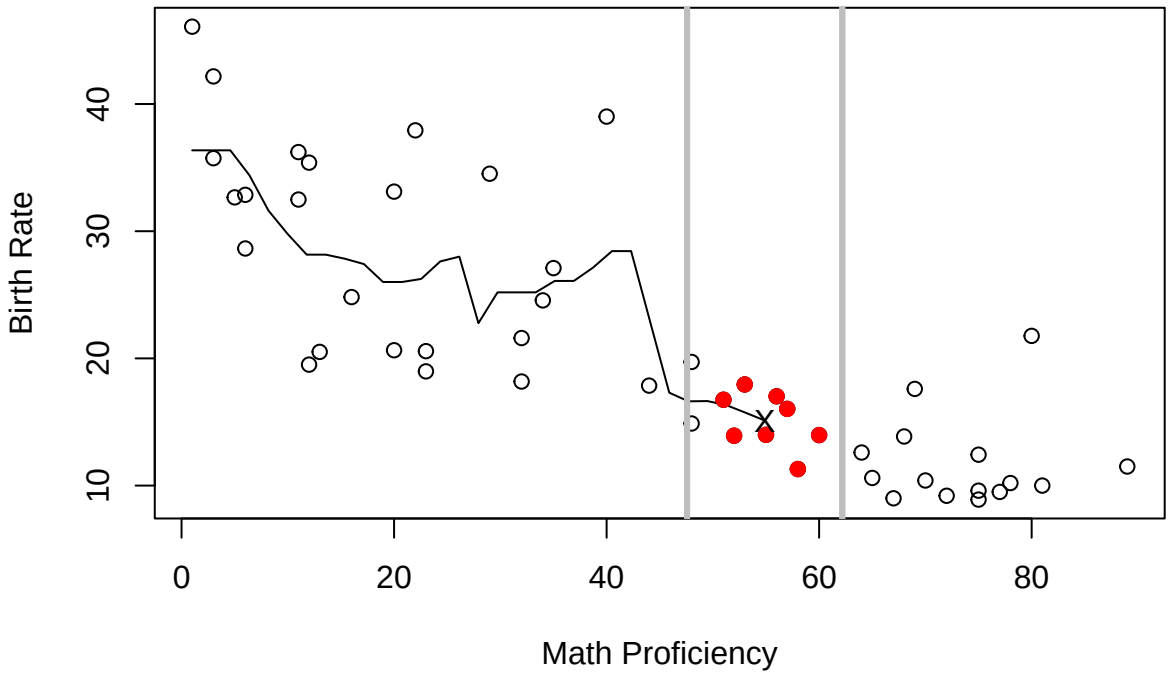
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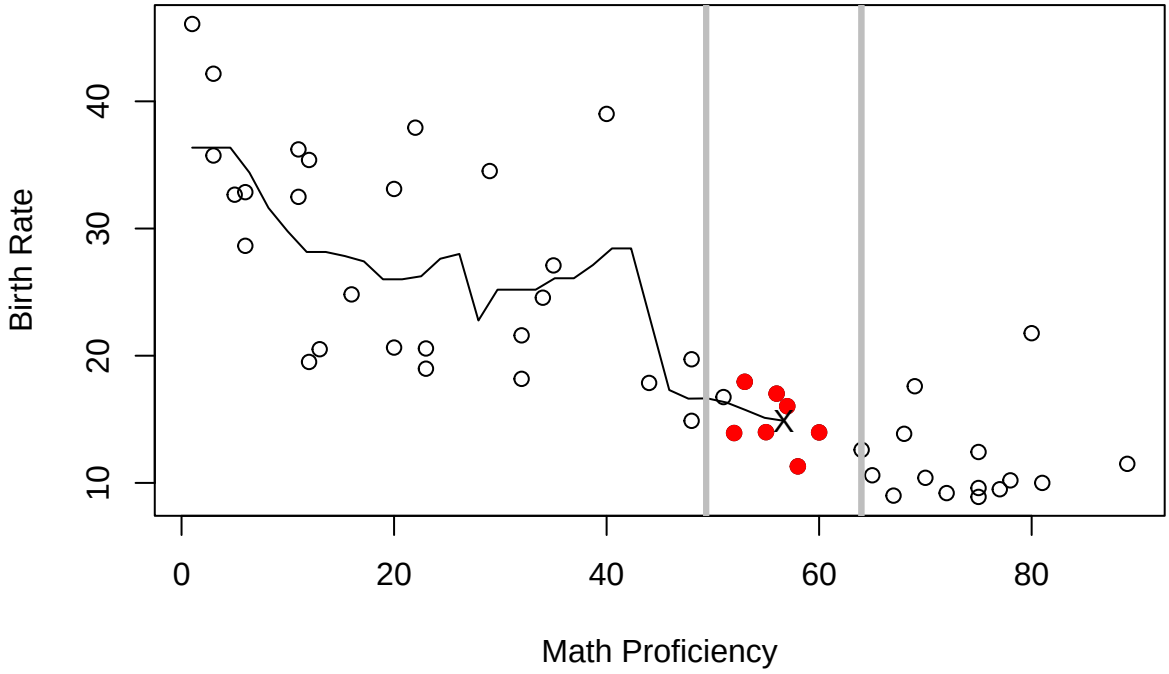
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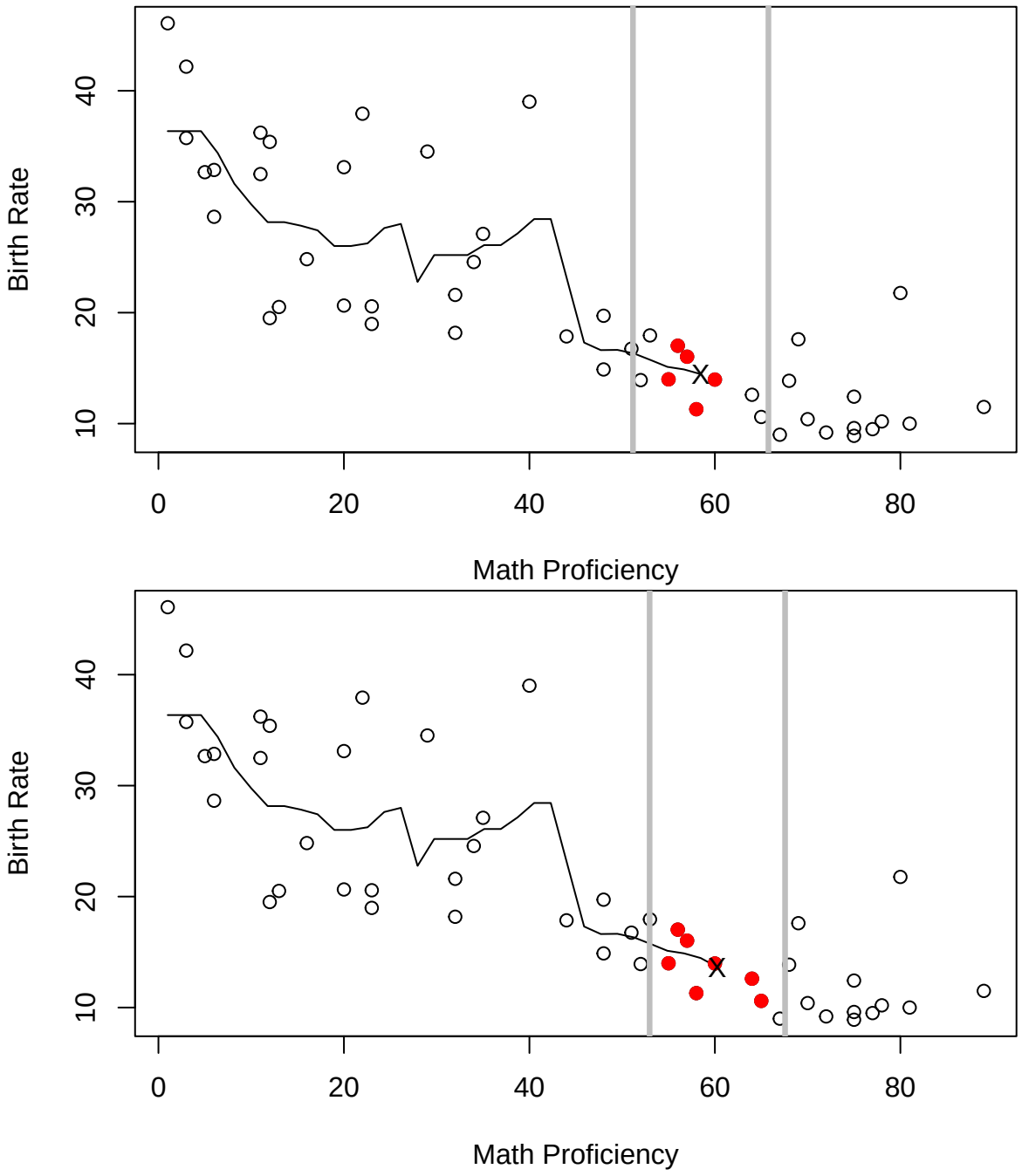
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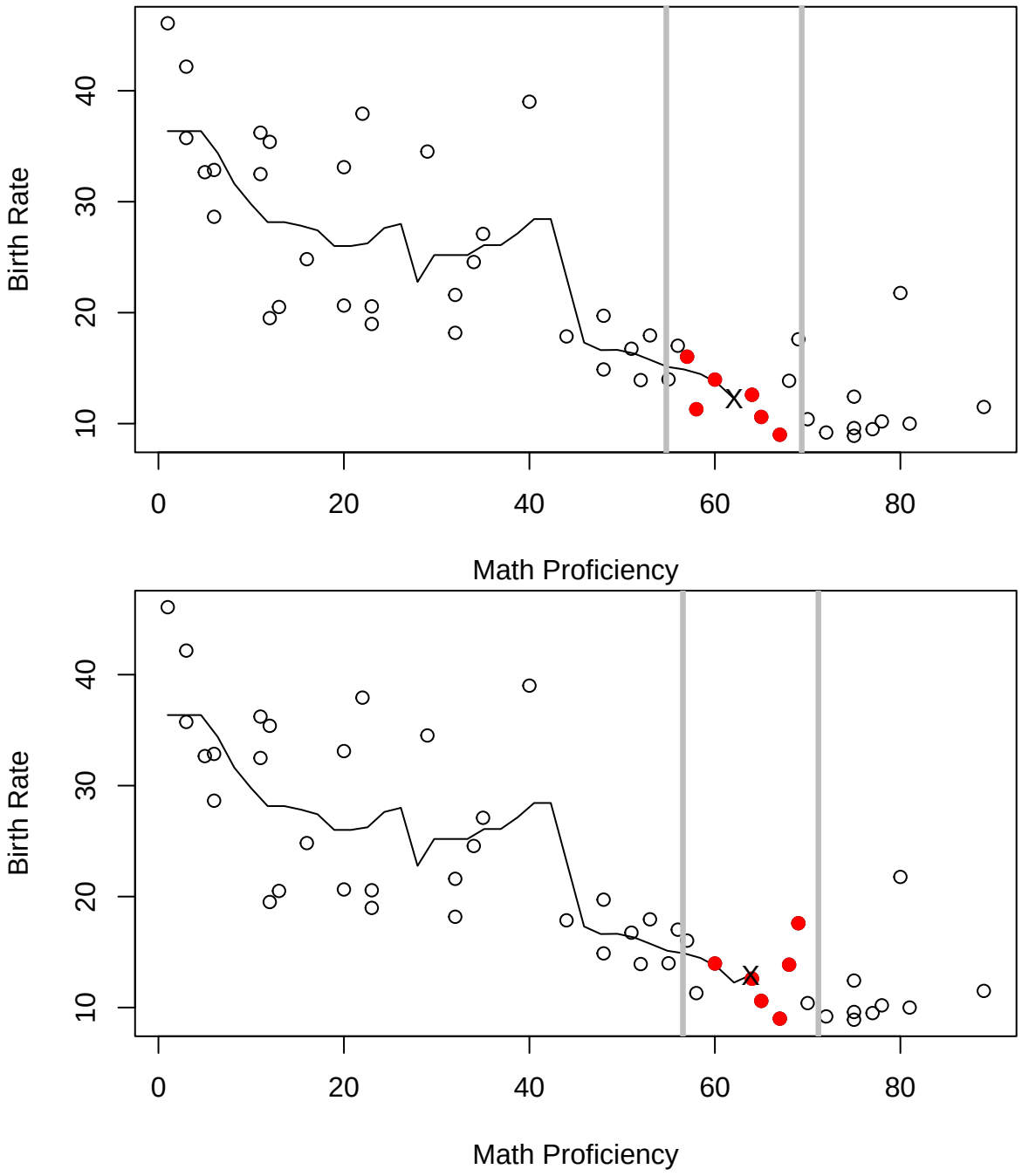
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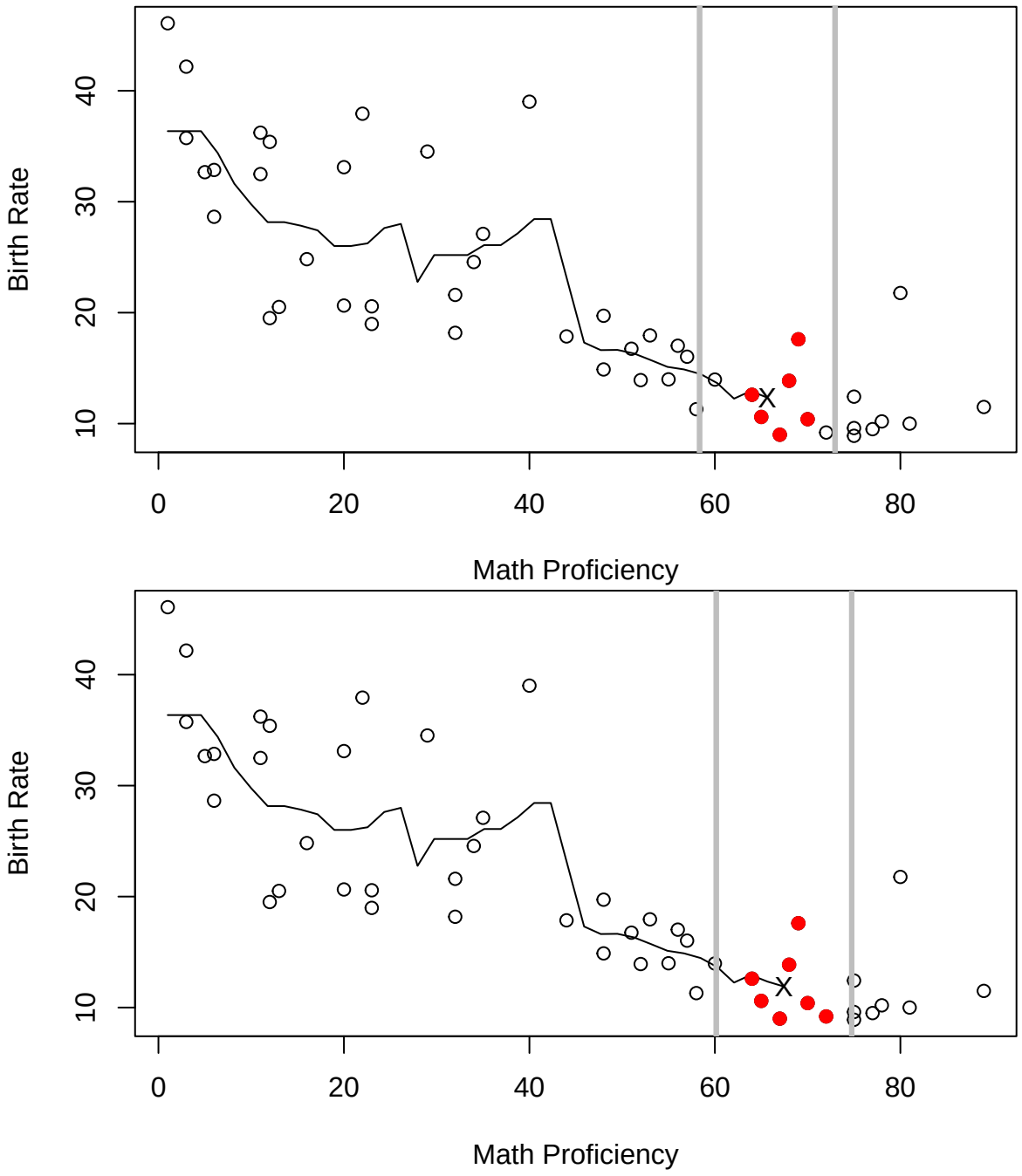
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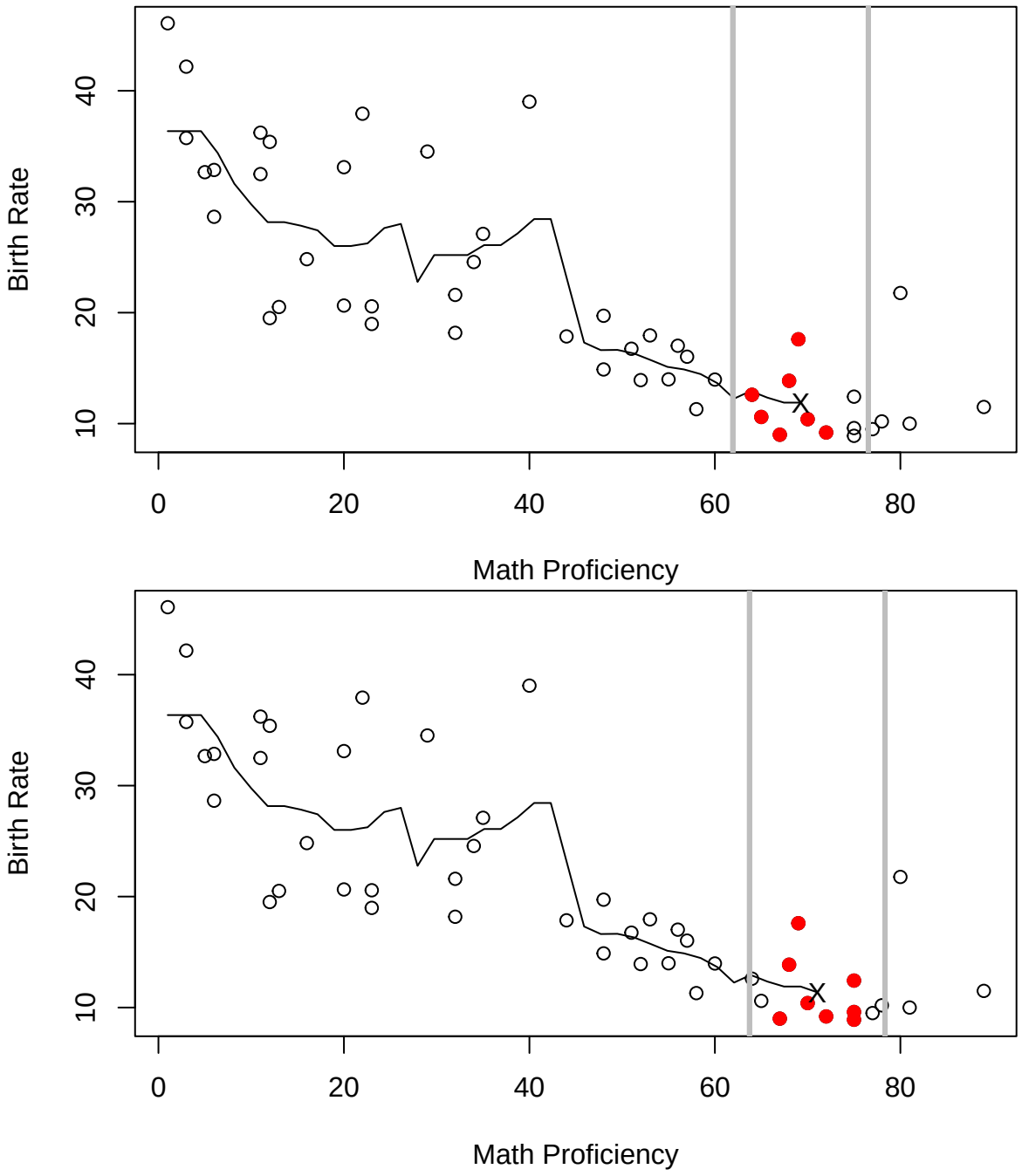
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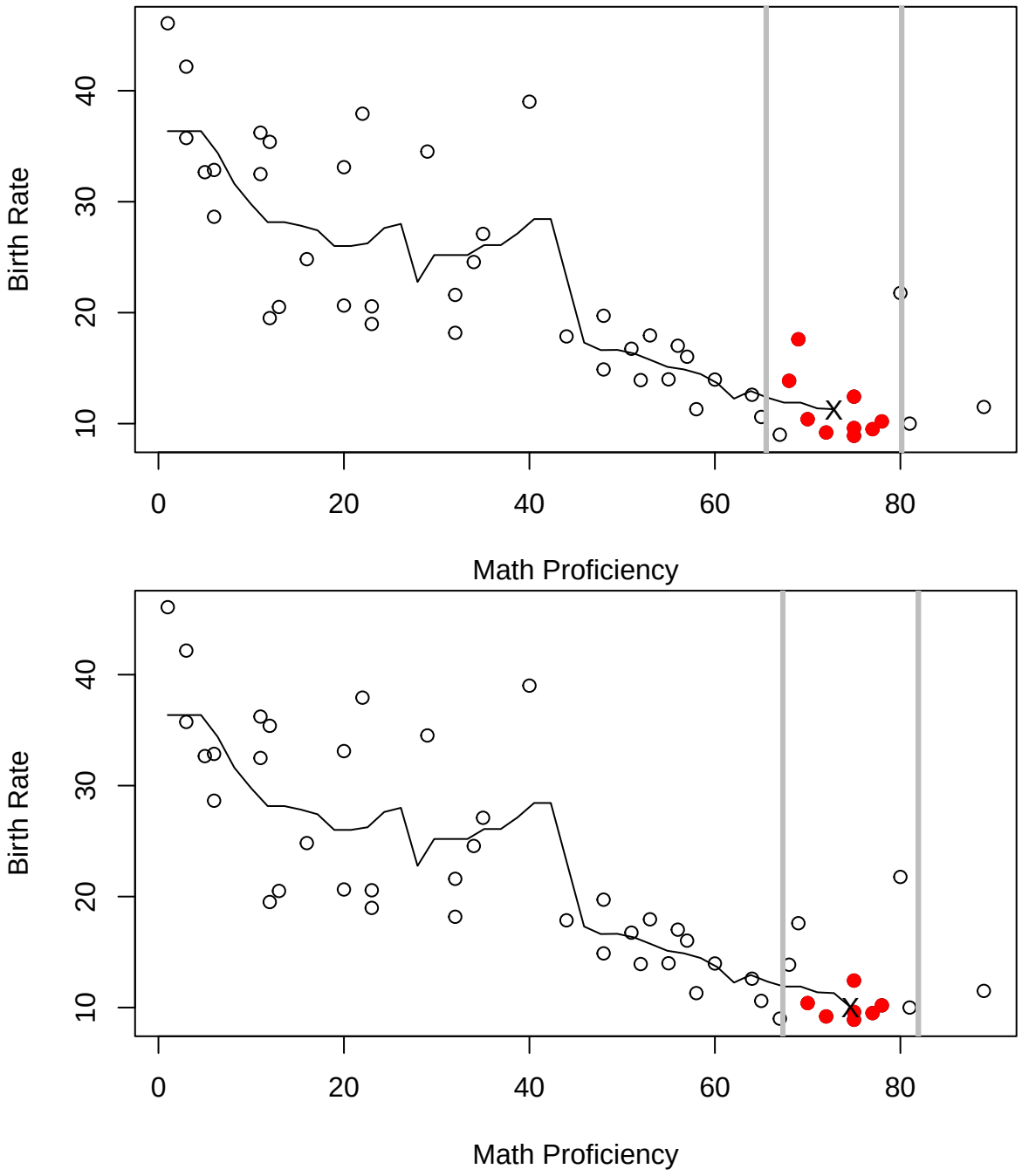
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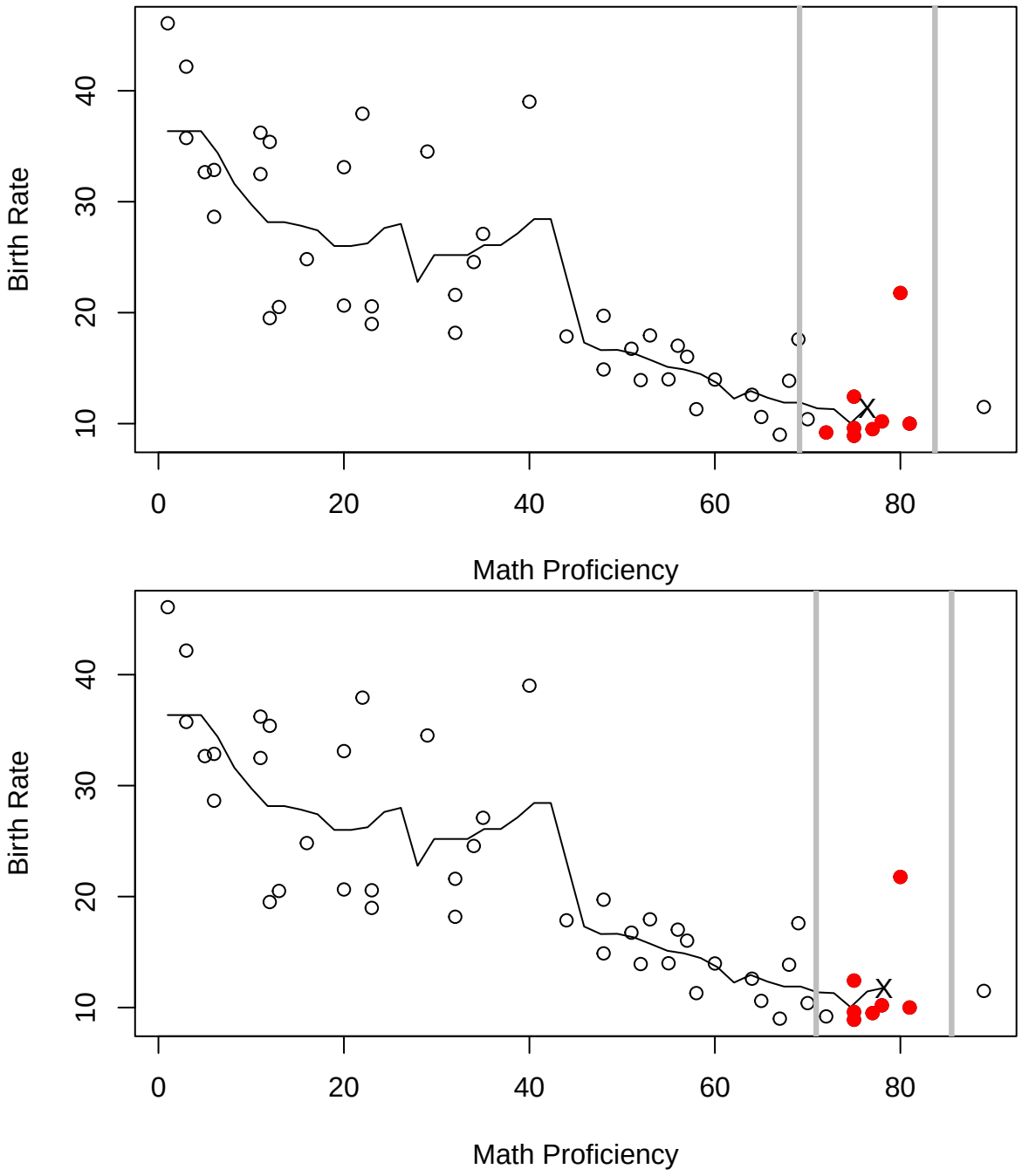
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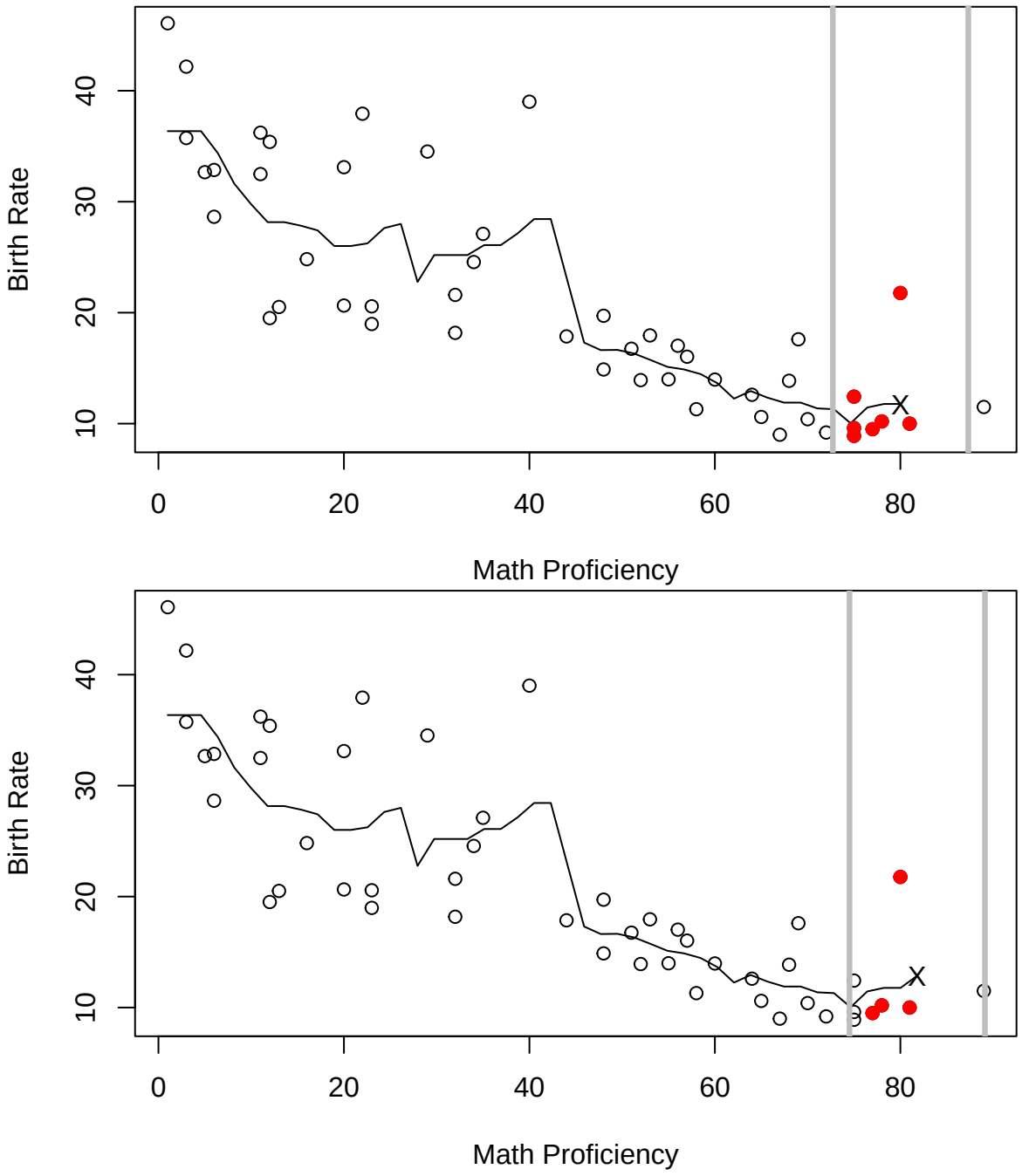
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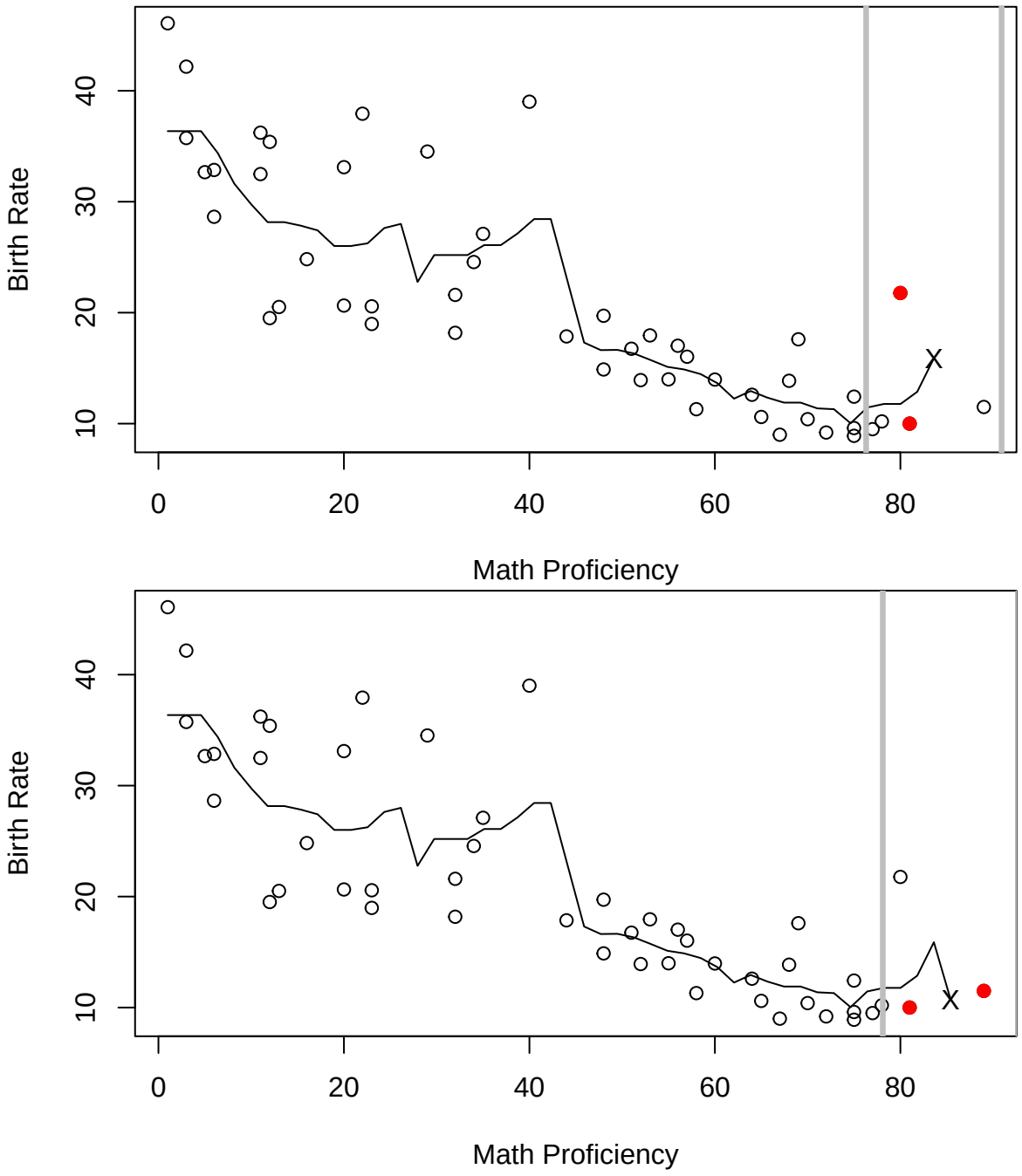
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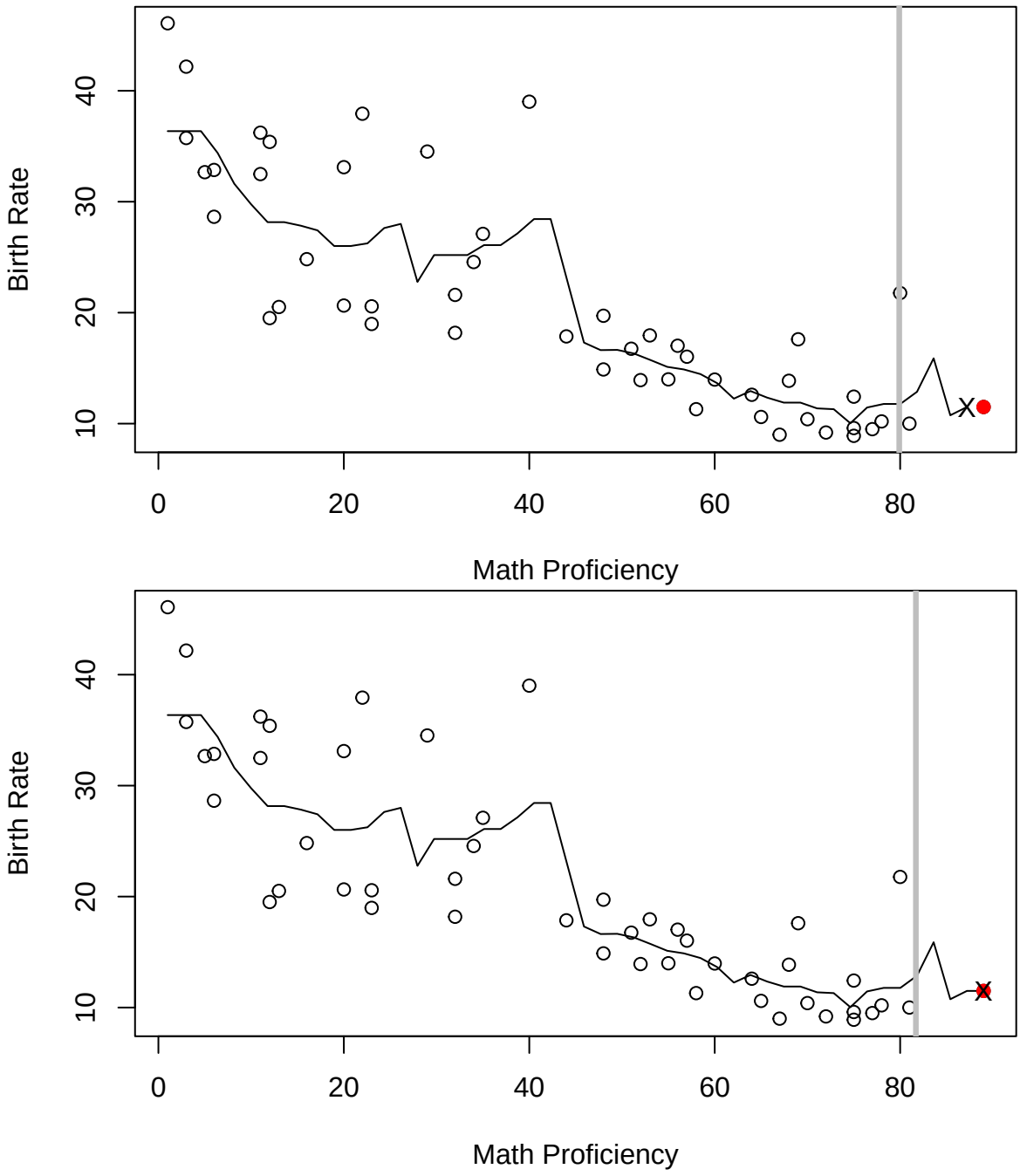
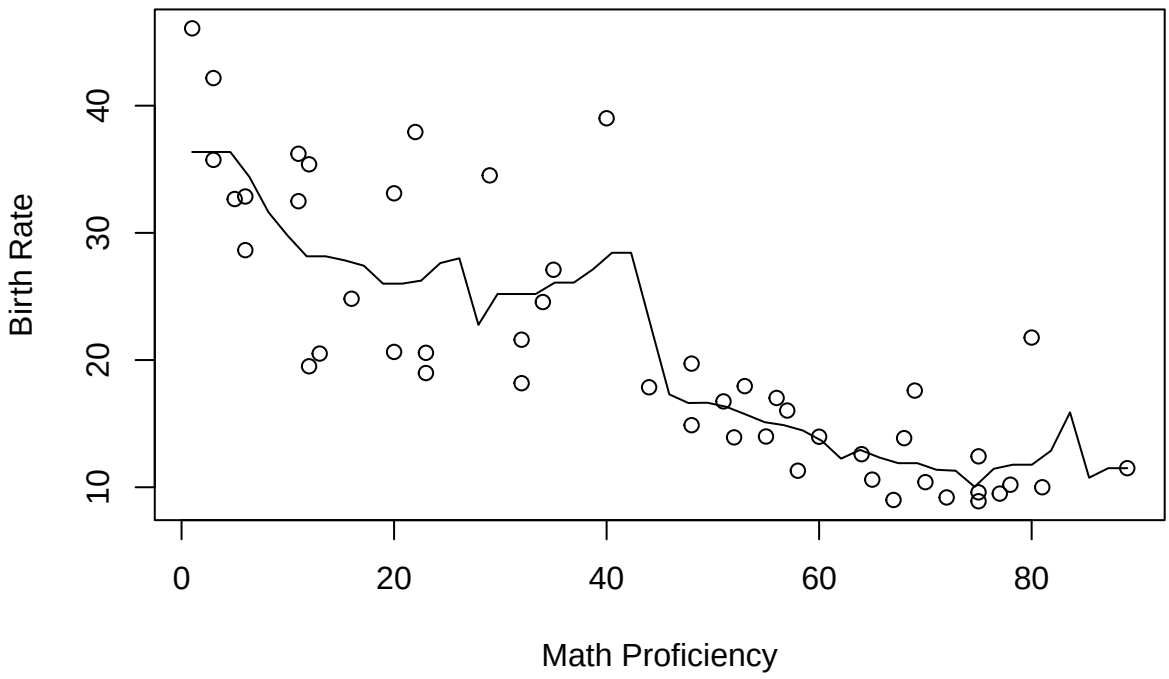



```
ani.options(oopt)
# final static image to present after animation
plot(filtered_math, filtered_birth,
    xlab="Math Proficiency", ylab="Birth Rate", main="Running mean smooth")
lines(rmsfit$xs, rmsfit$ys)
```




```
saveHTML(rmsani(filtered_math,filtered_birth,optimalbw,1), htmlfile="~/Documents/SDSU /Stat580/FinalPro
```

```
## HTML file created at: ~/Documents/SDSU /Stat580/FinalProject/rmsani1.html
```

```
source("rlsani.R") # running line smooth function to create animation frames
# set time interval (in seconds) and number of frames for the animation
oopt = ani.options(interval = 0.25, nmax = 50)
# function creating smooth in each neighborhood of 50 equally-spaced points
rls = rlsani(filtered_math,filtered_birth,optimalbw,1)
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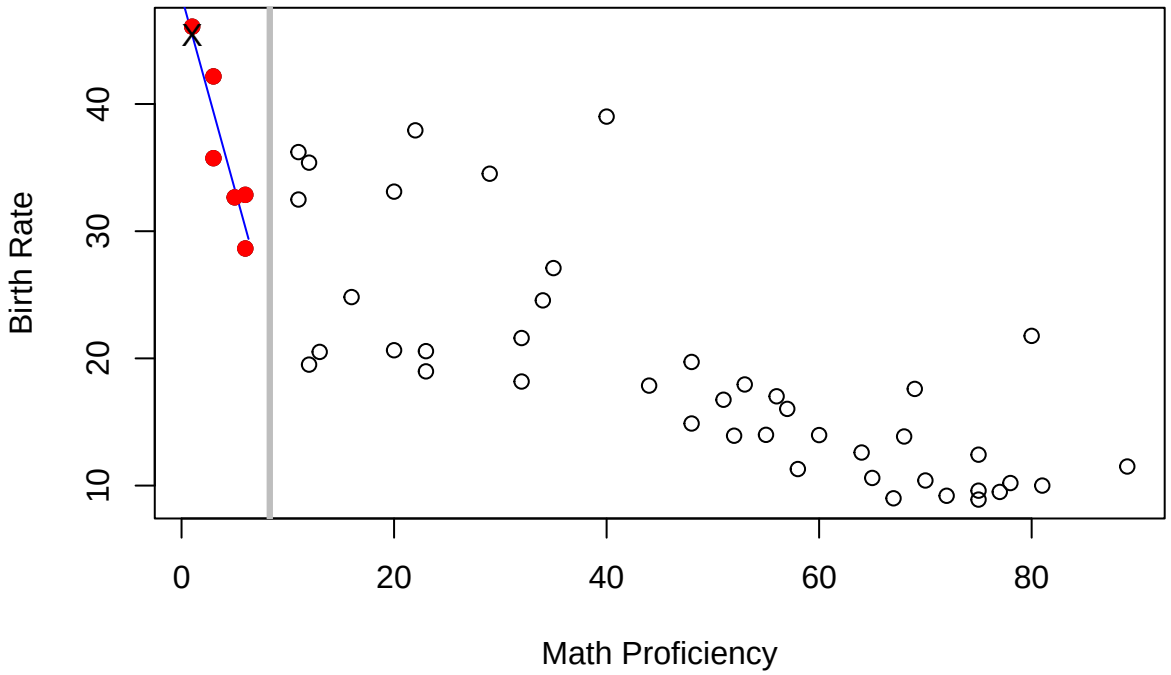
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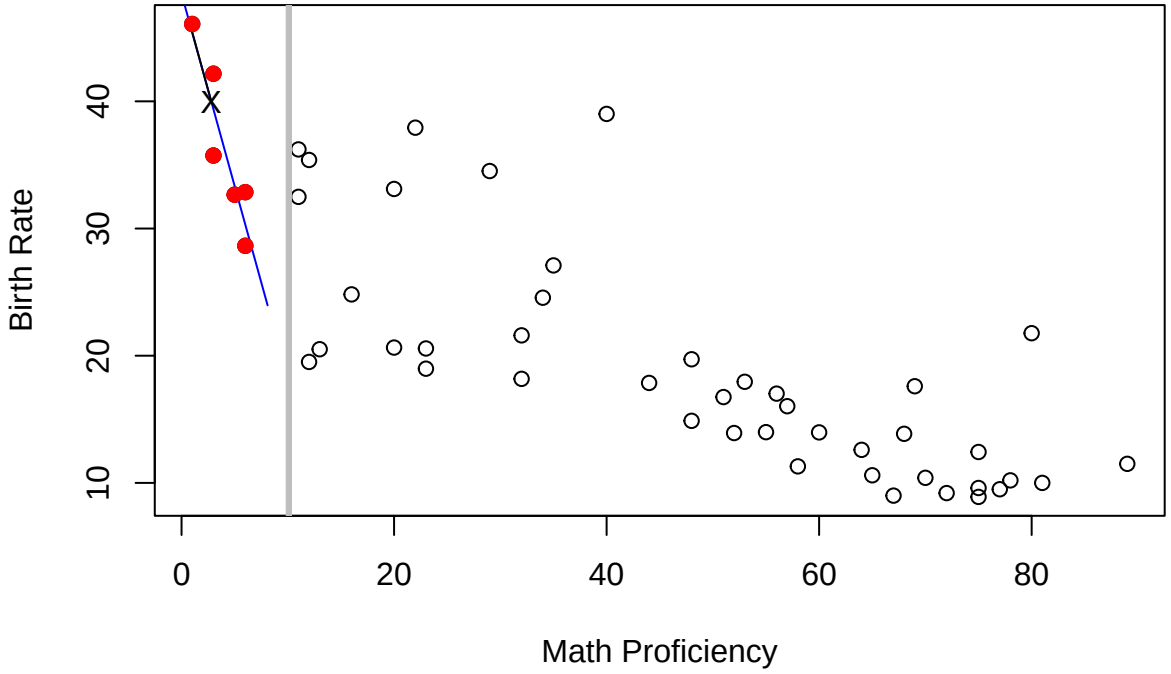
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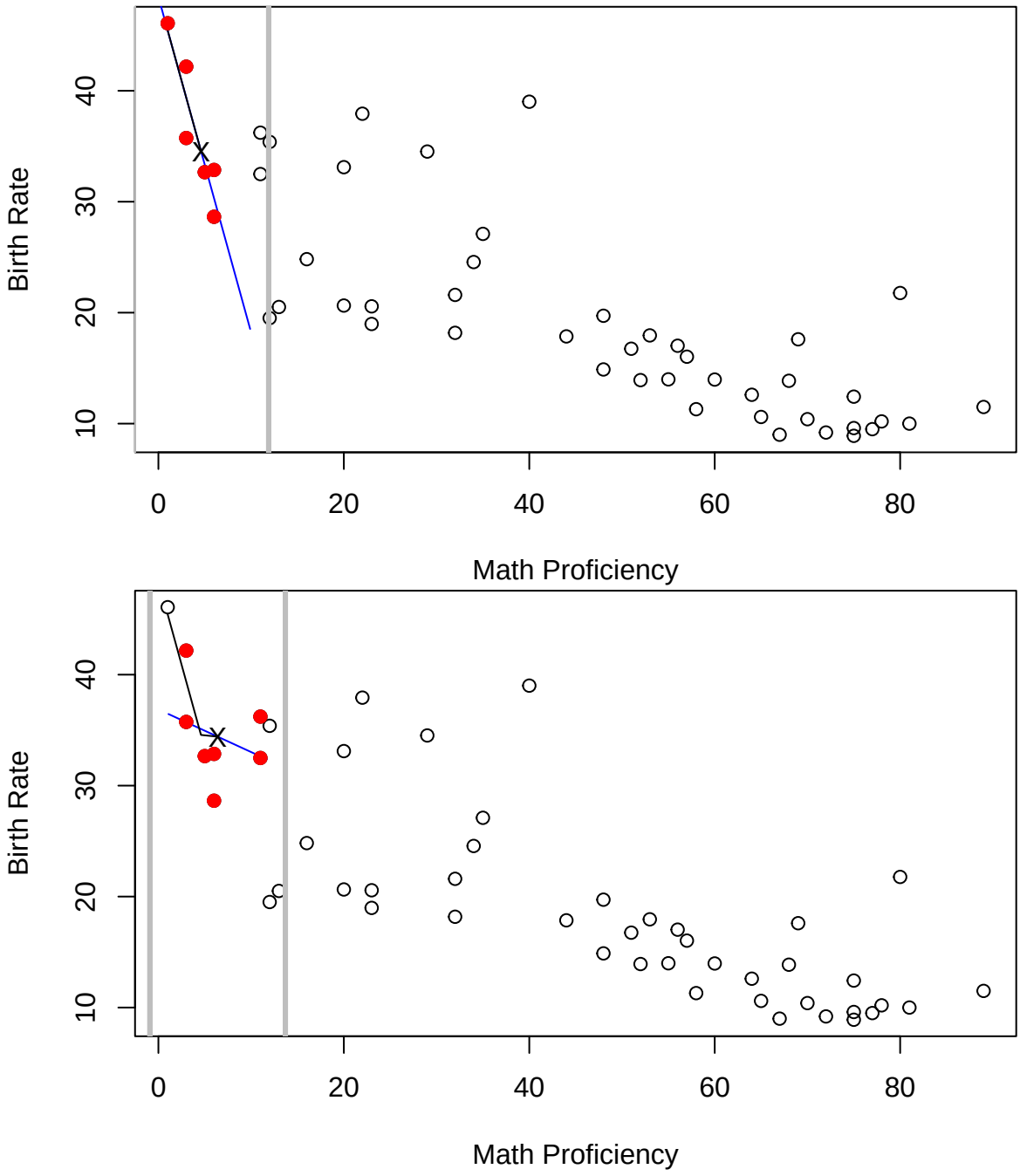
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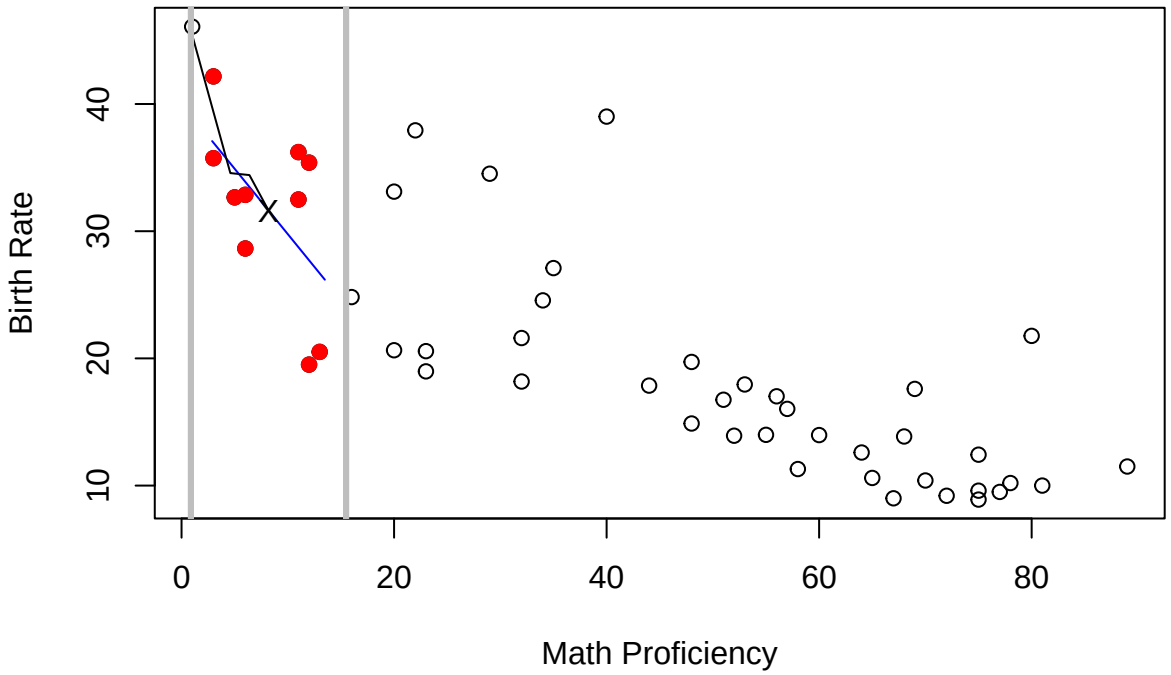
Math Proficiency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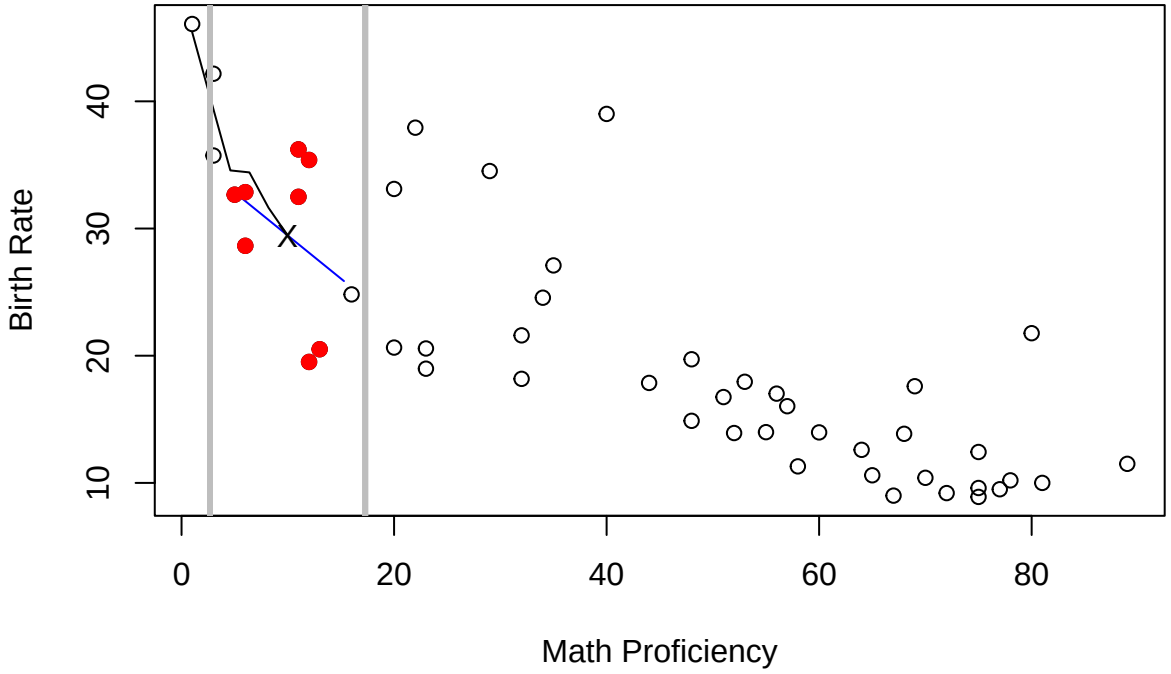
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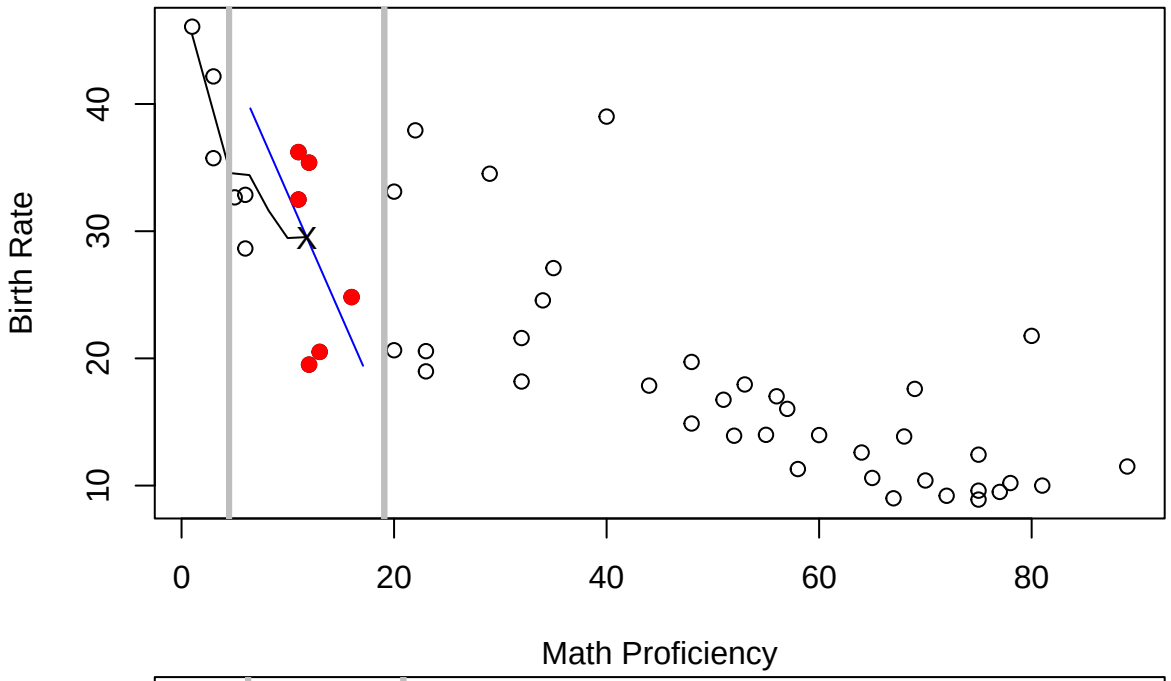
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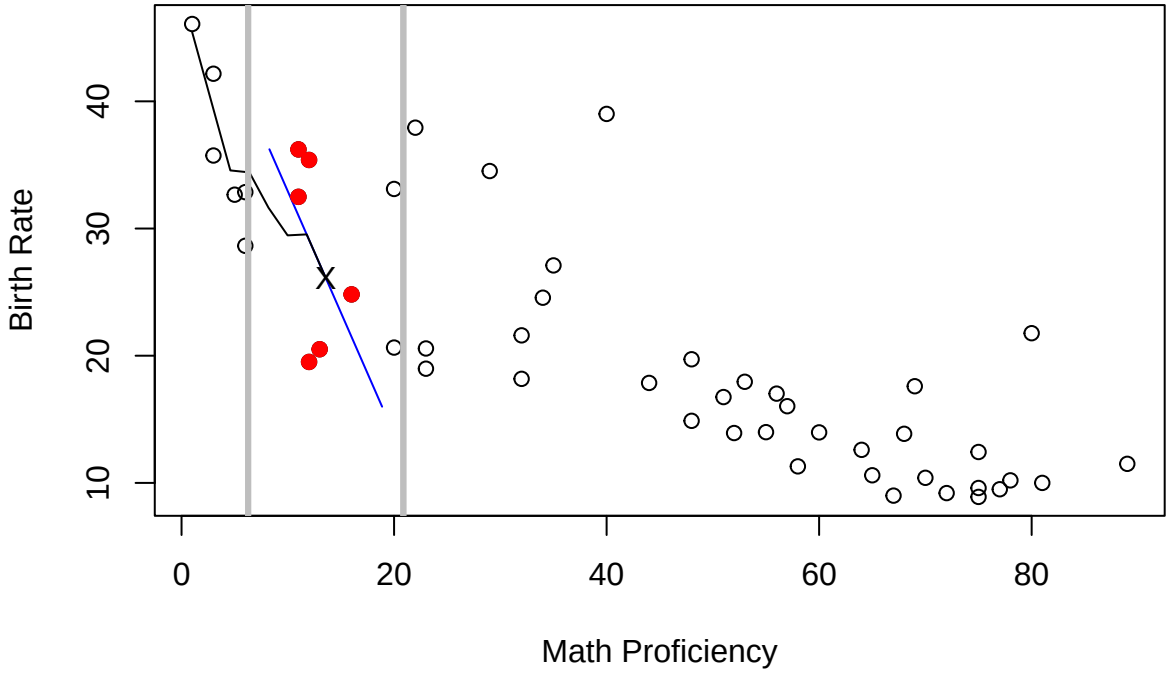
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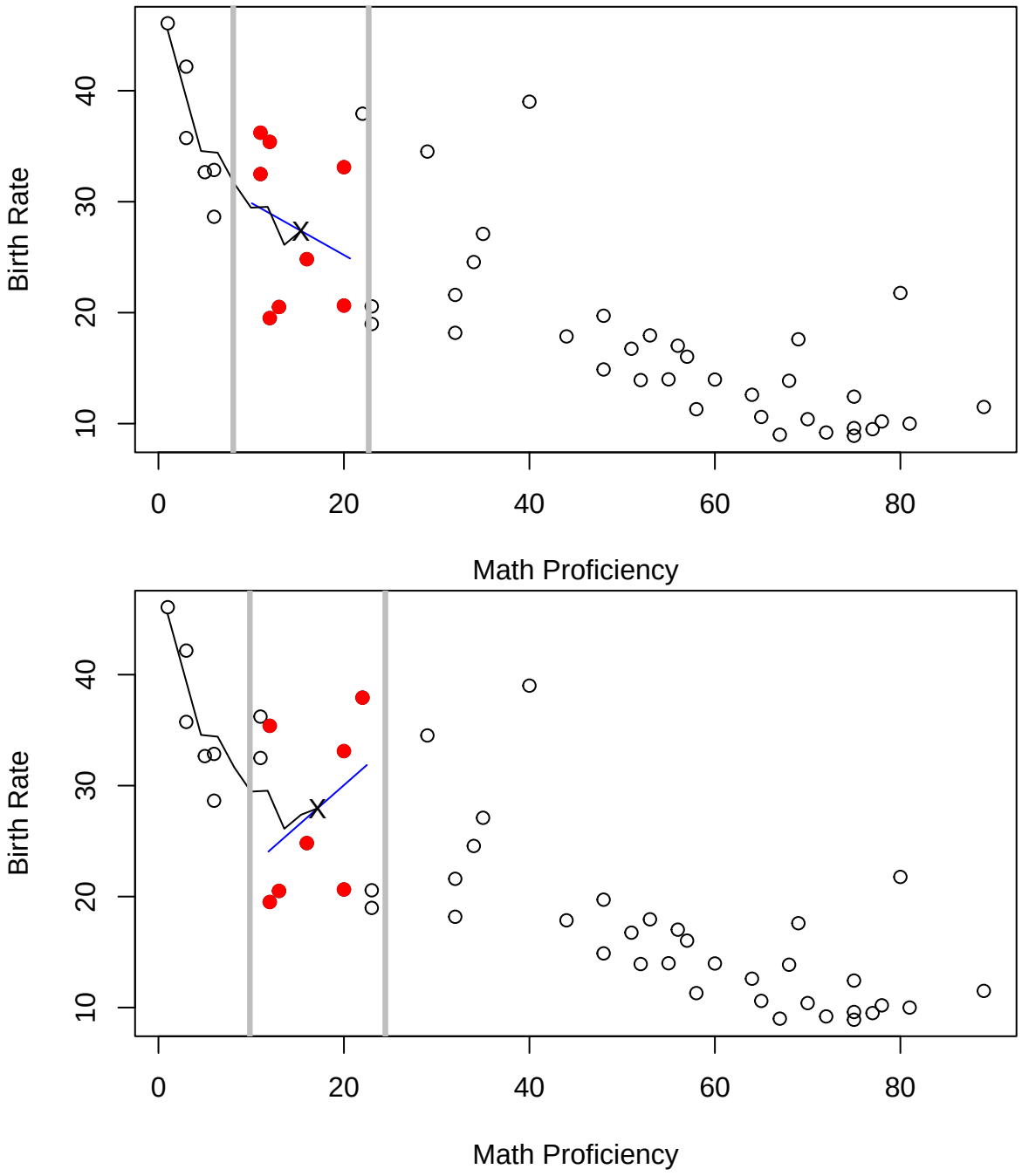
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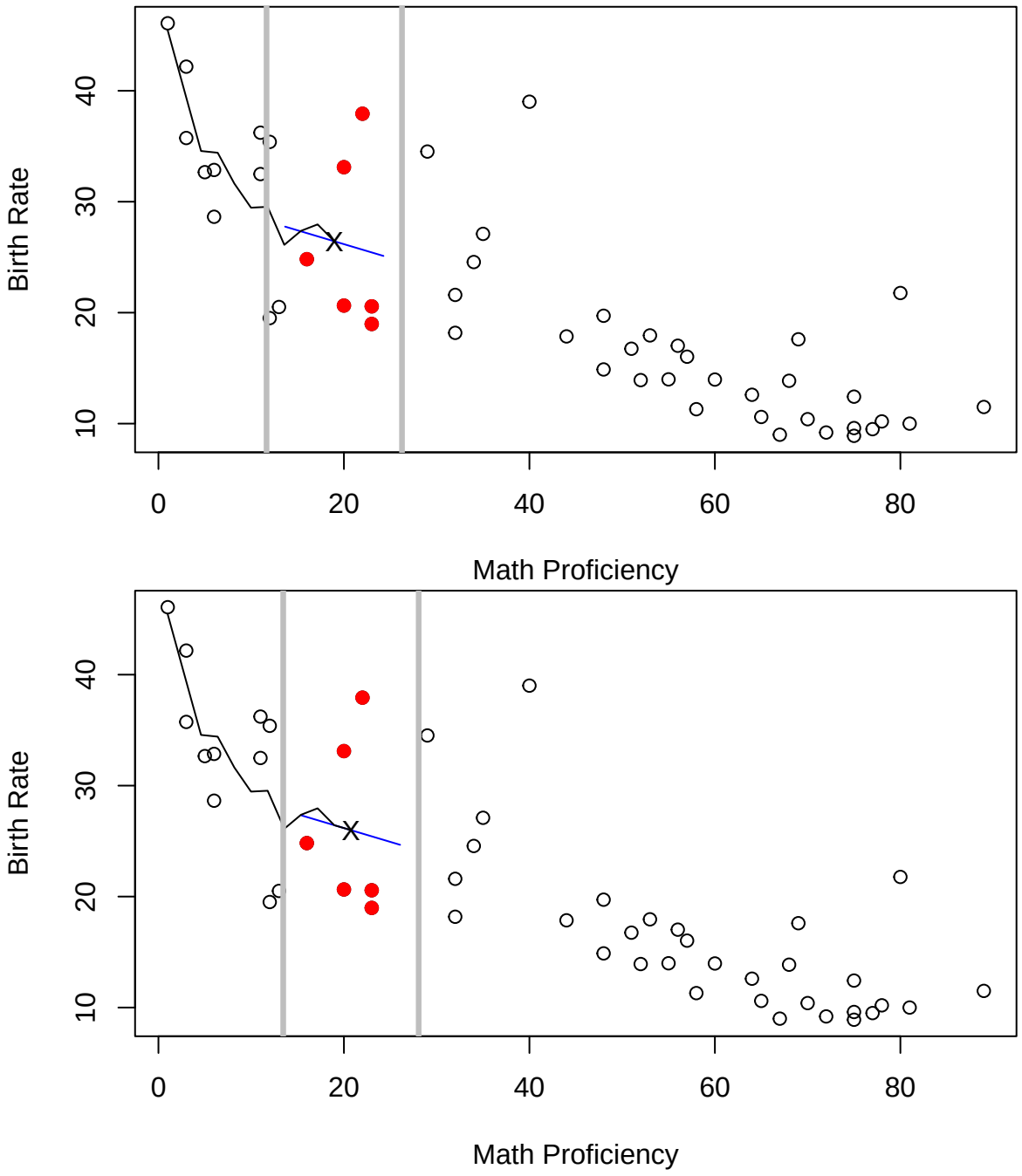
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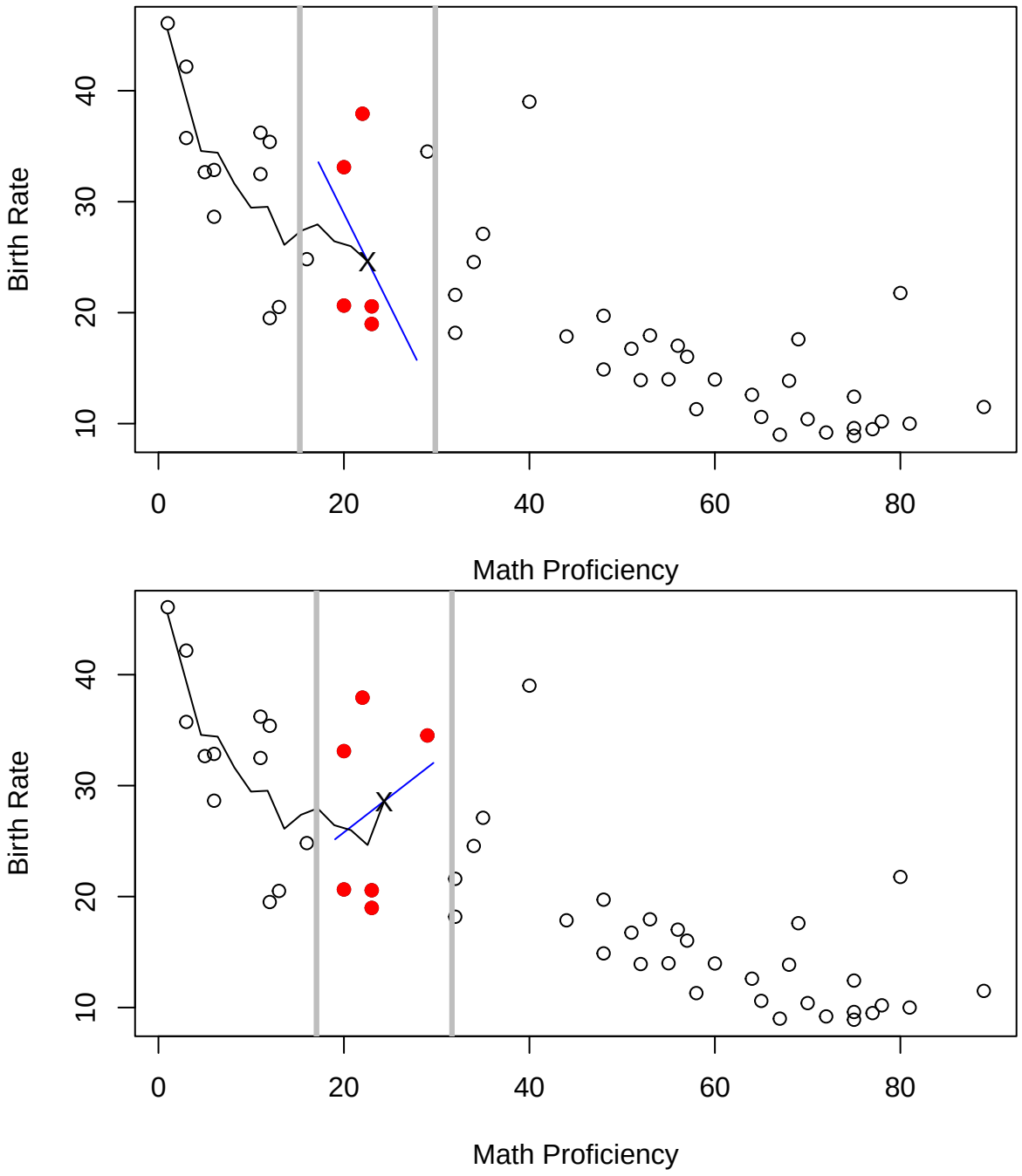
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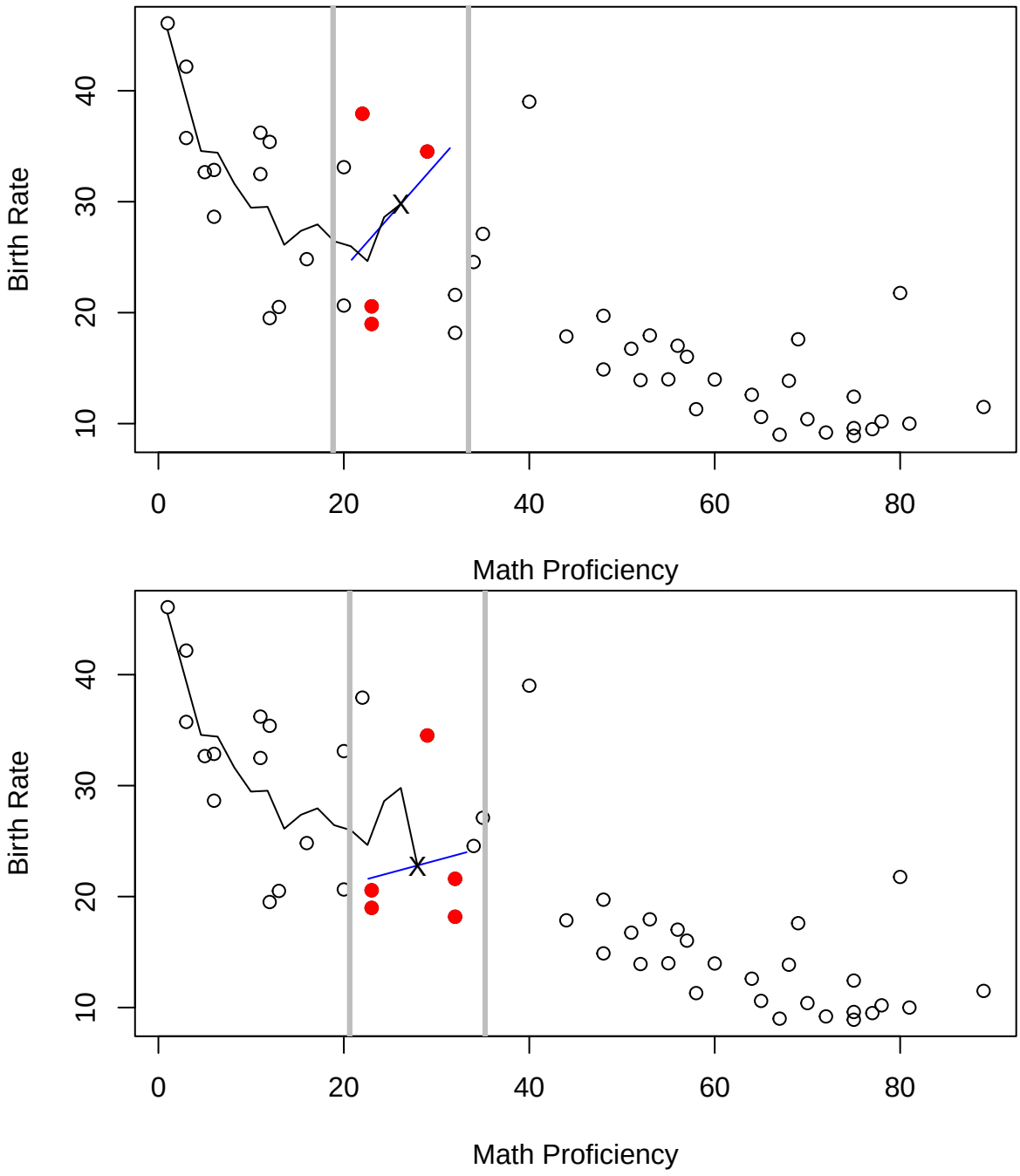
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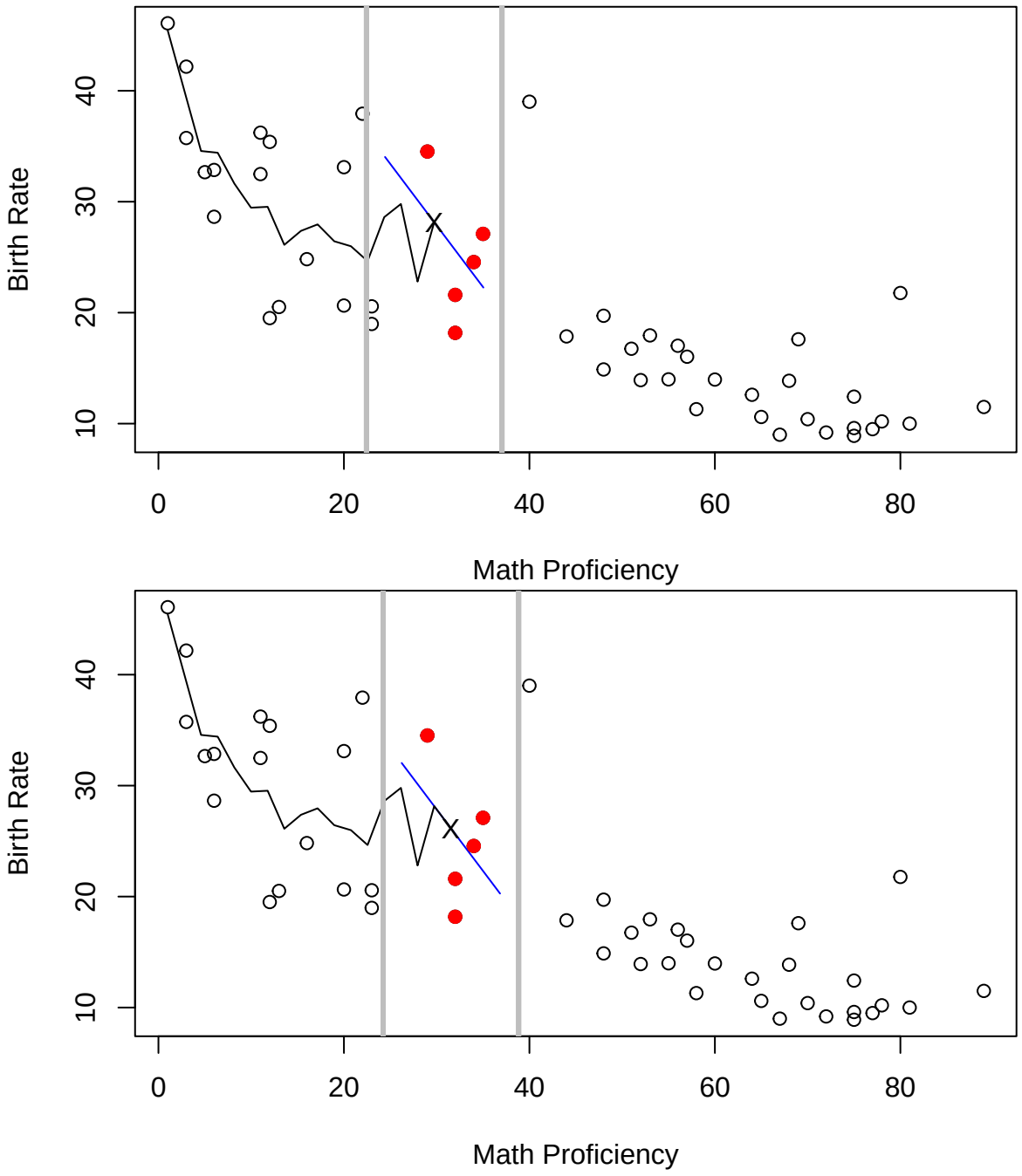
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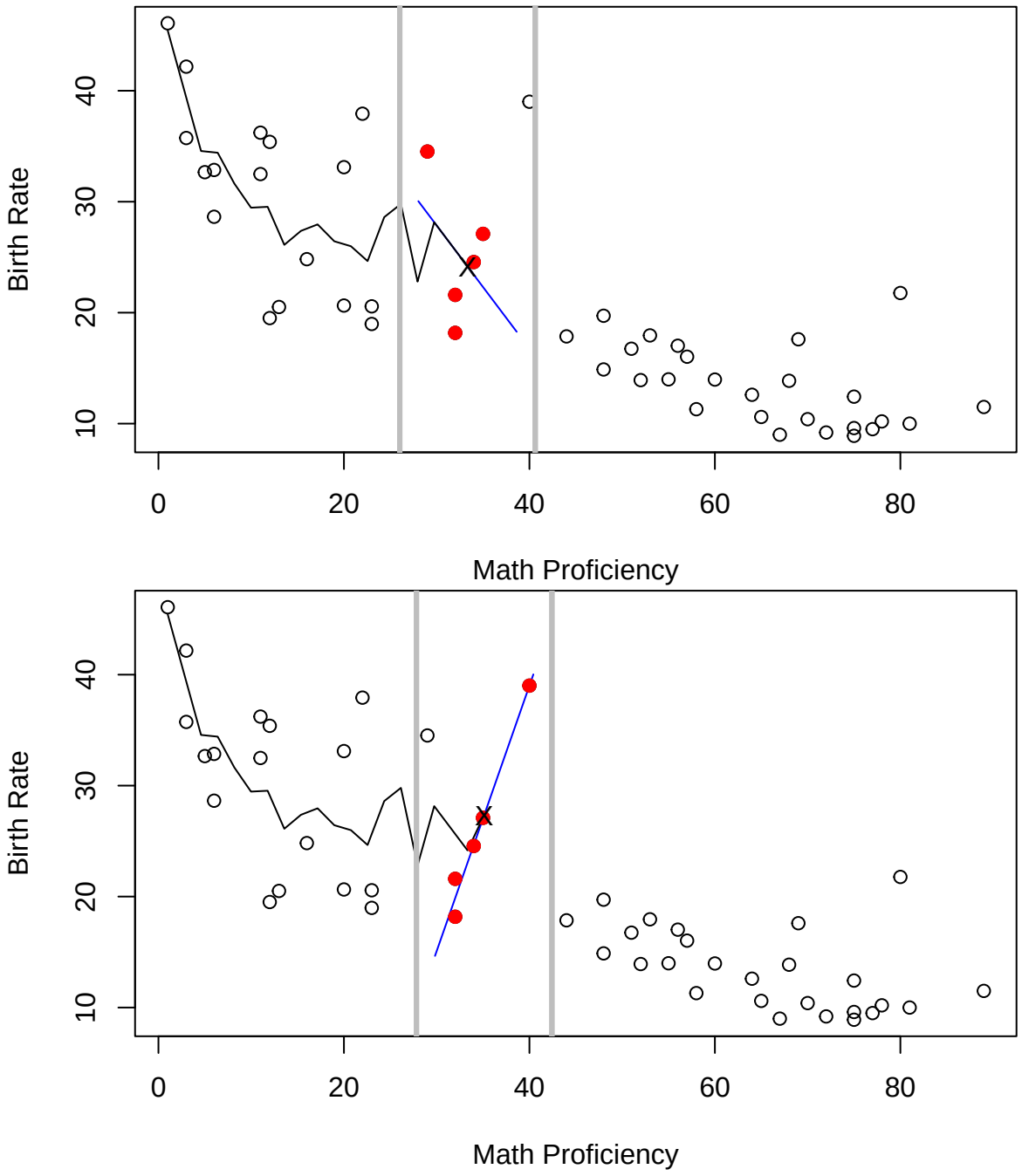
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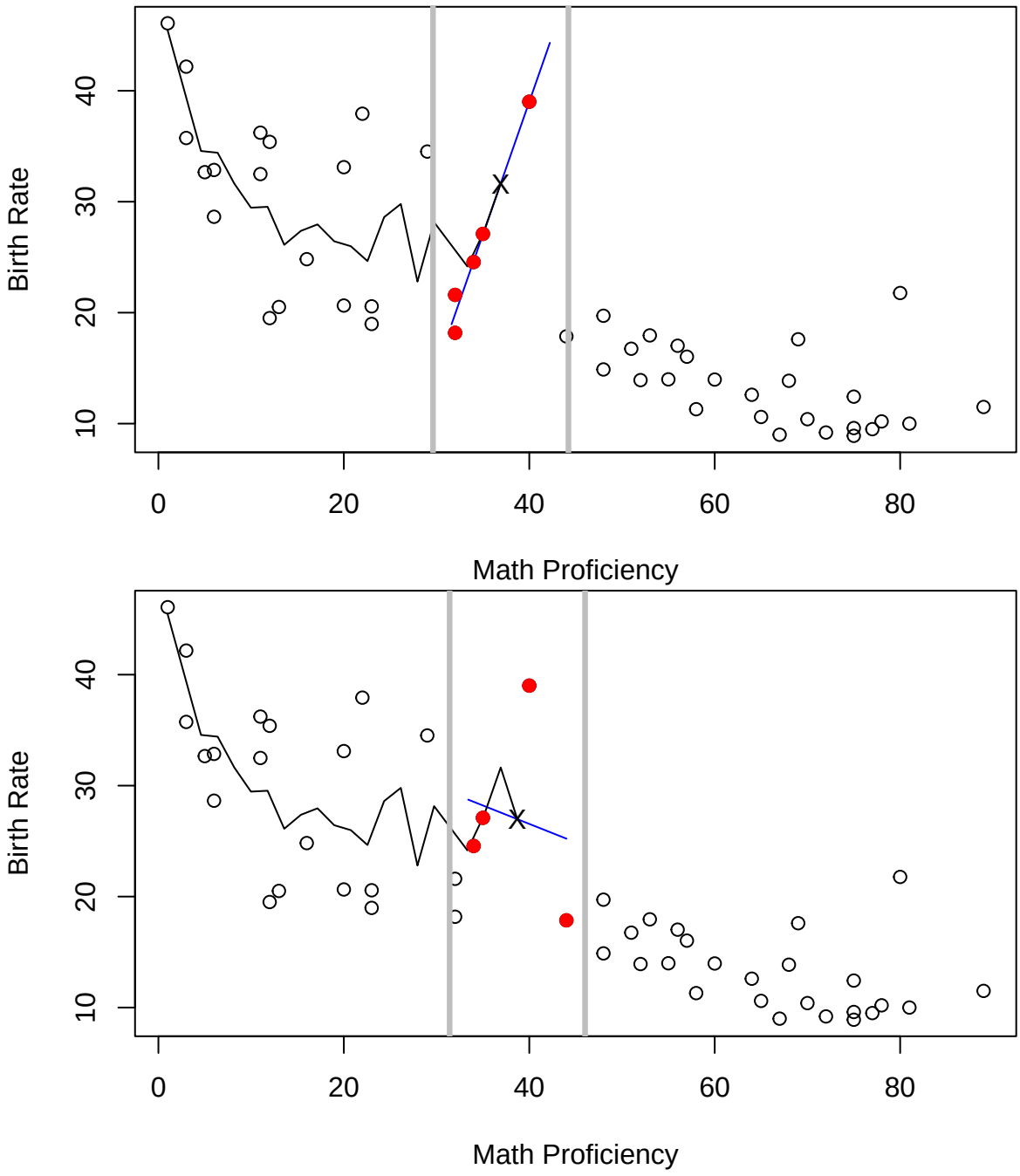
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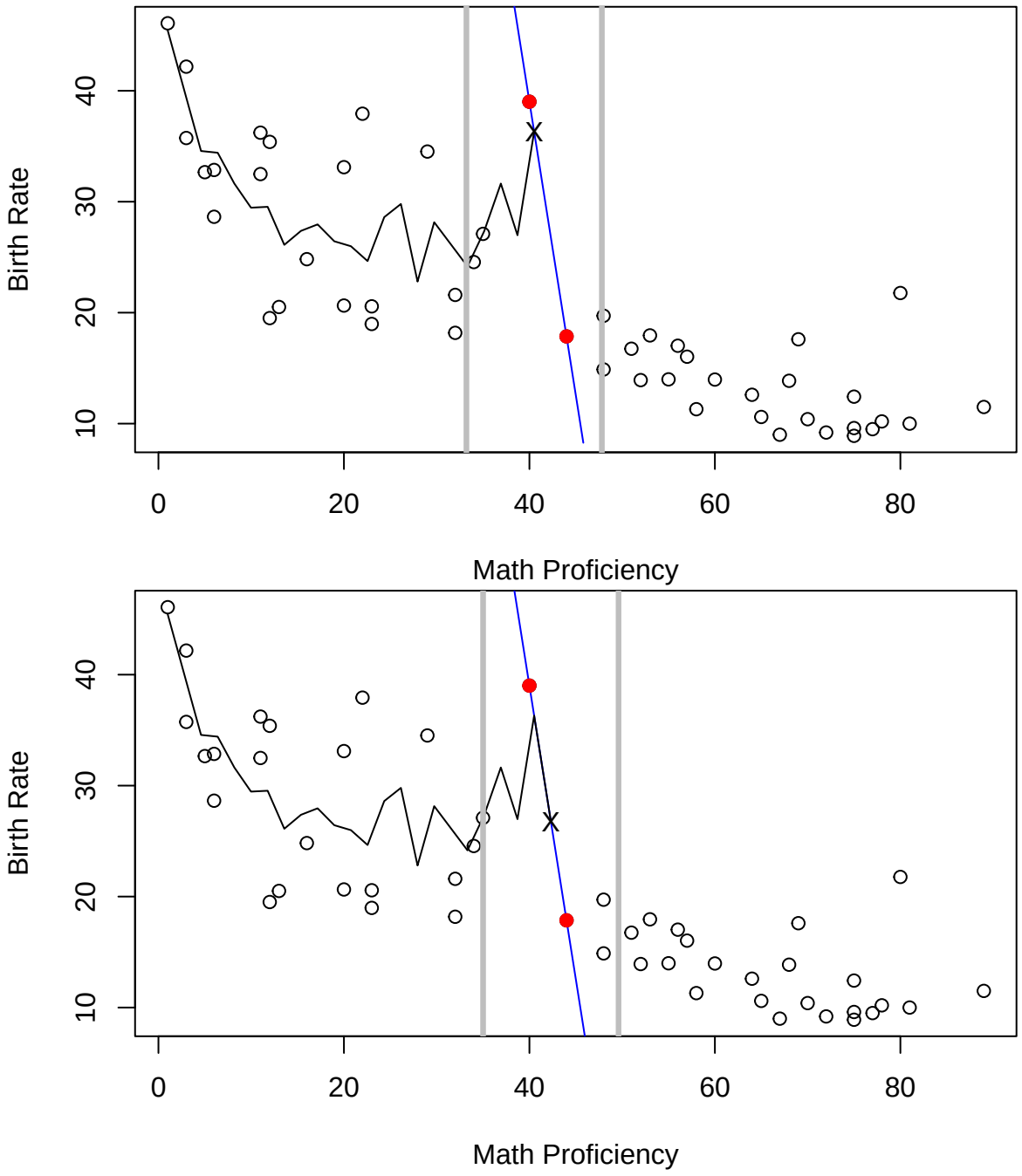
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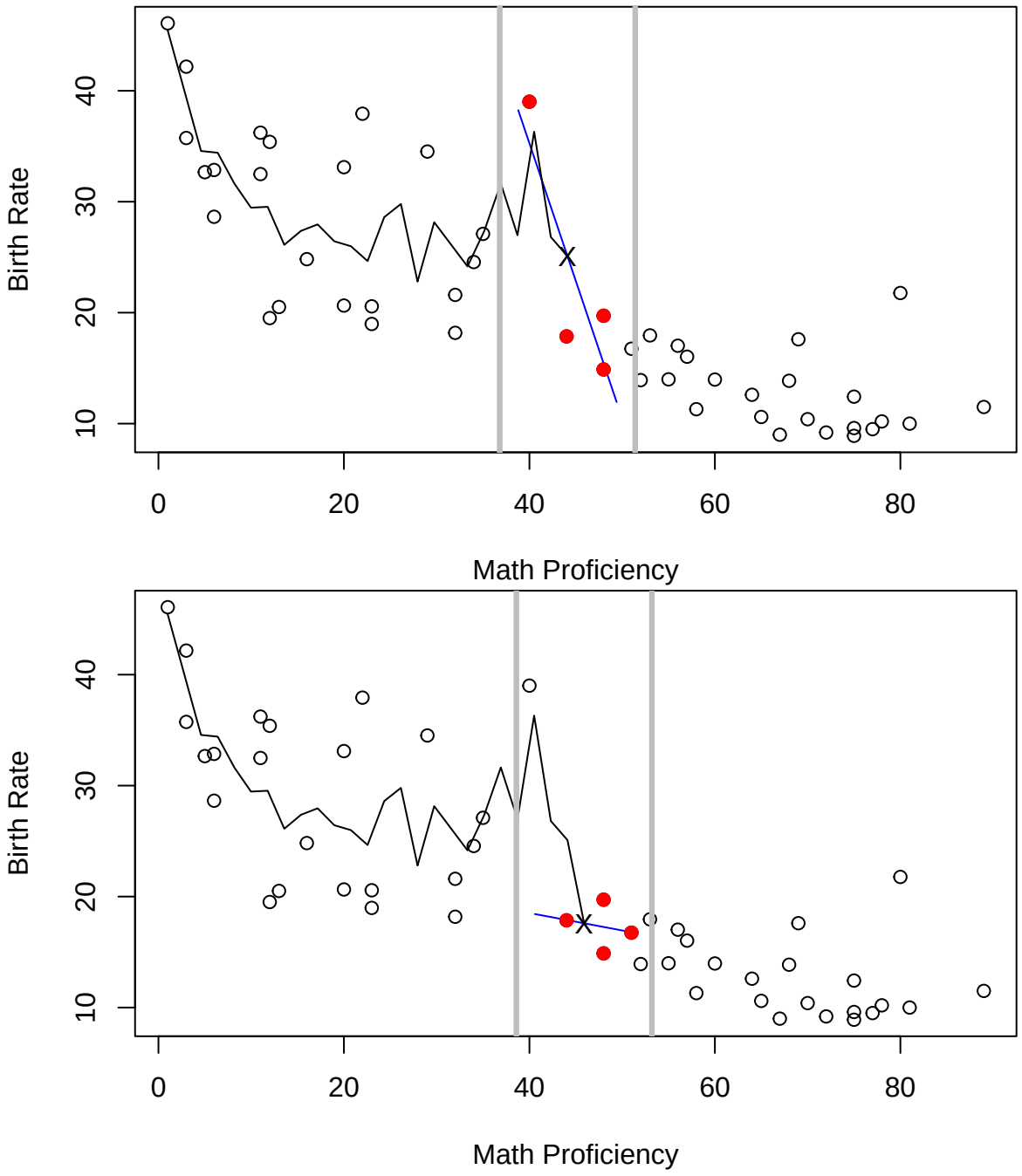
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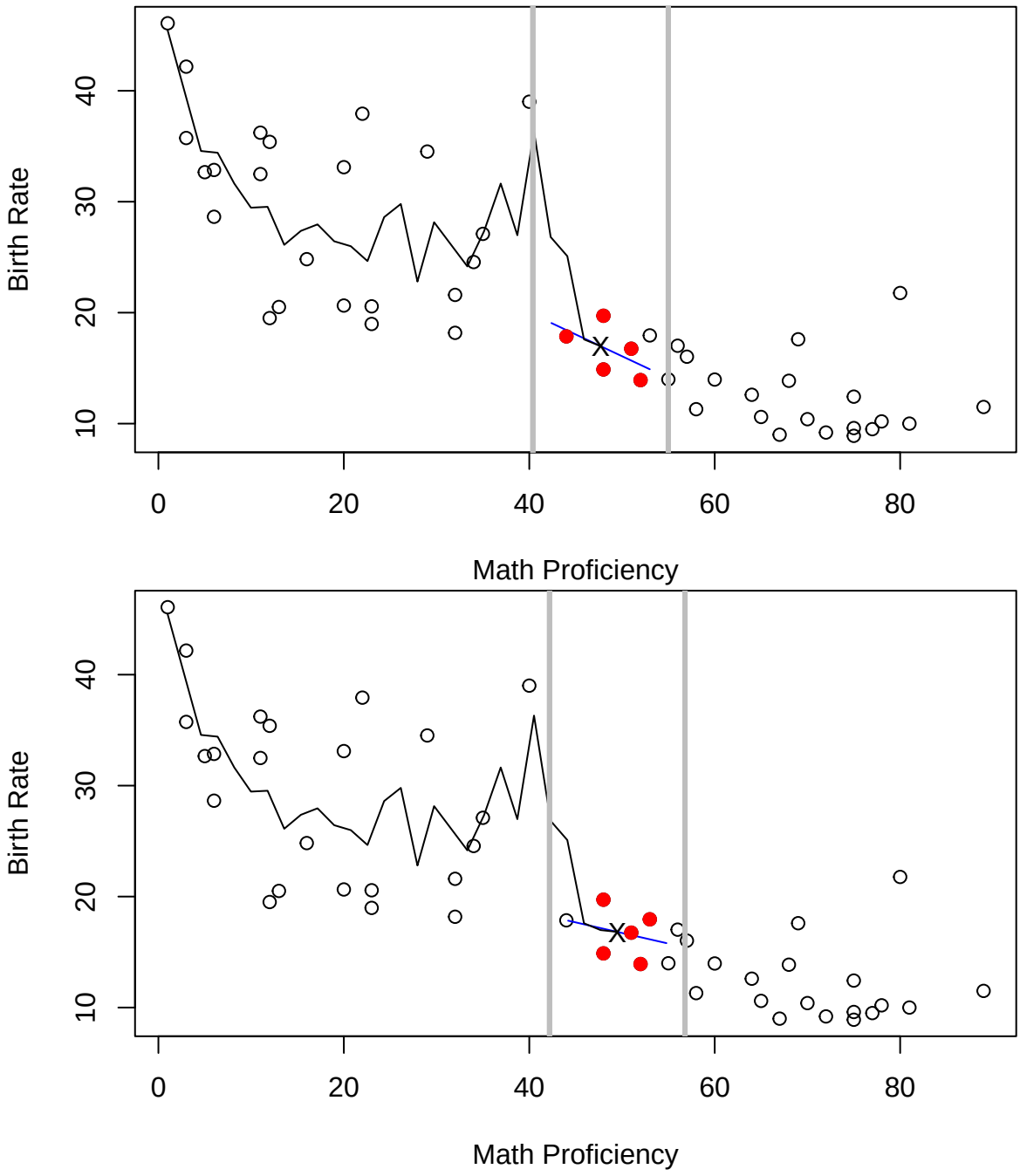
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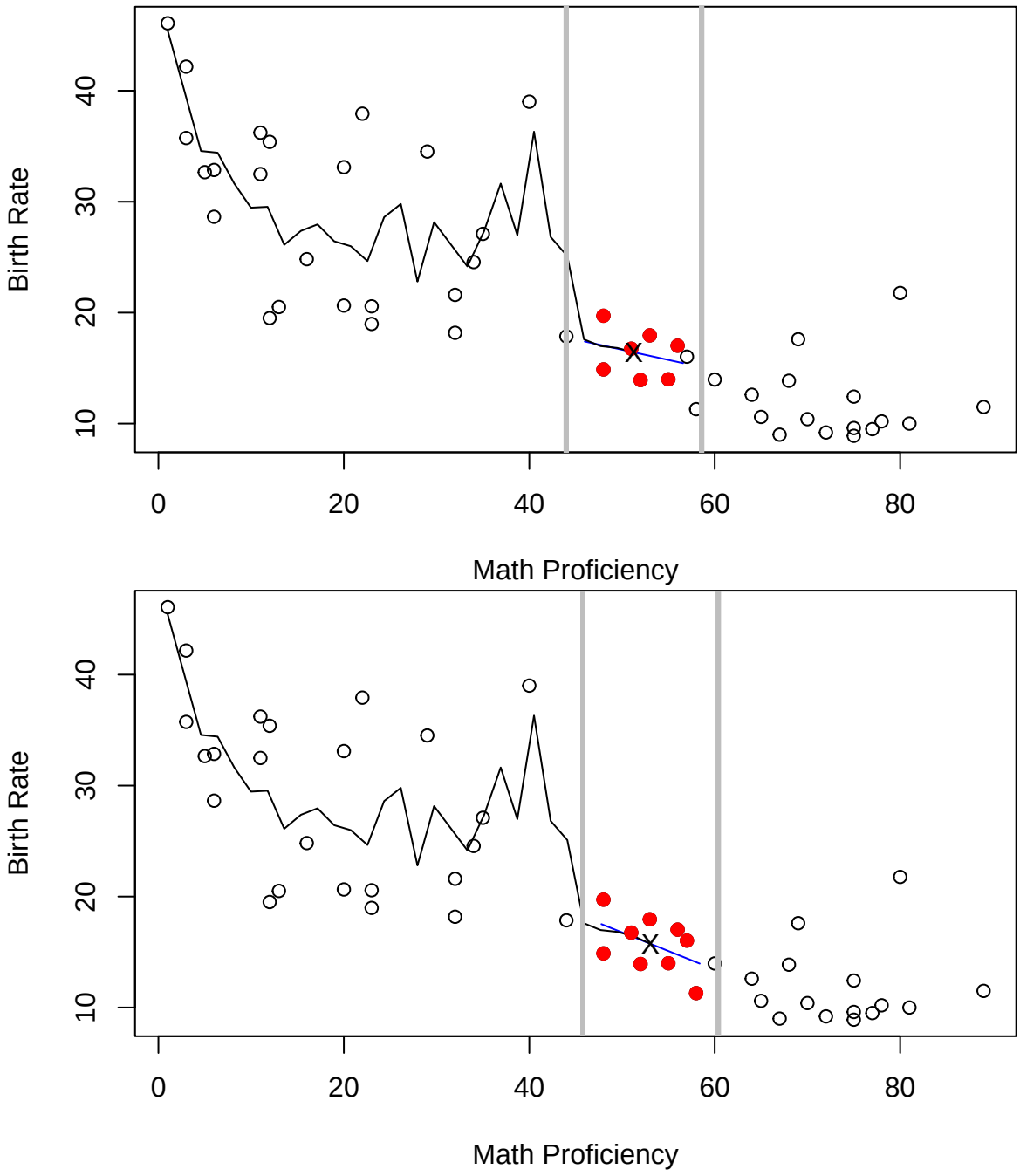
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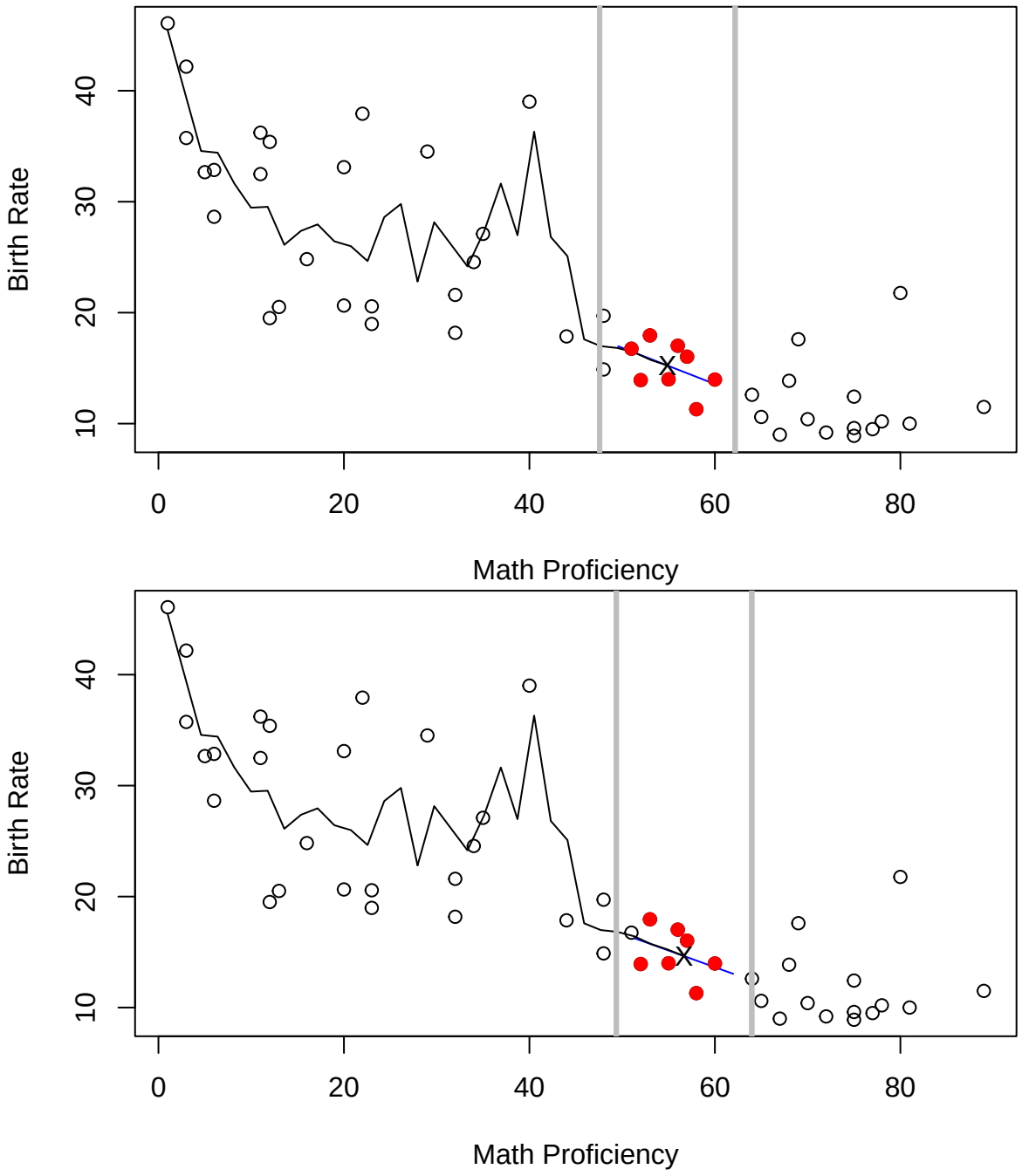
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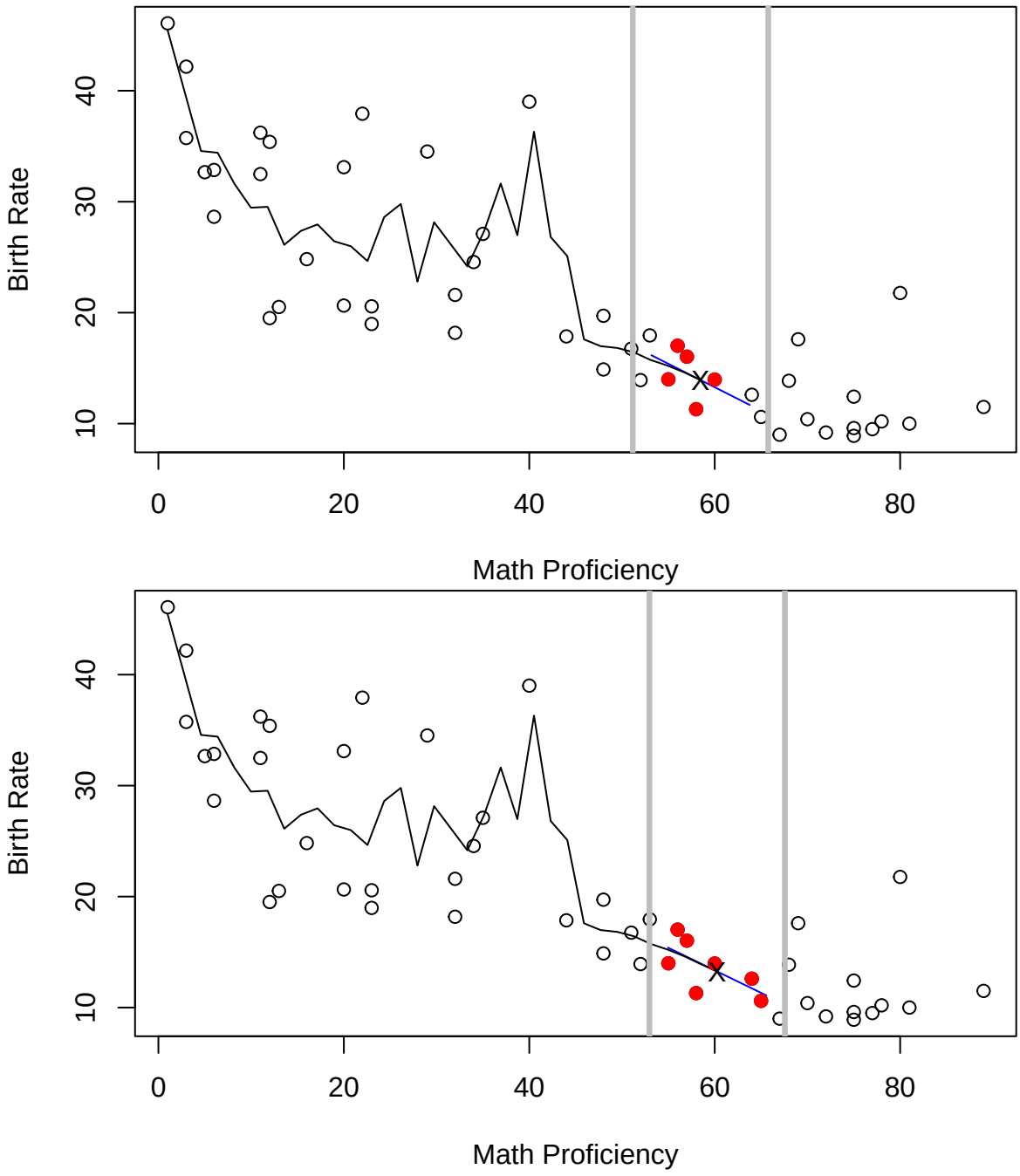
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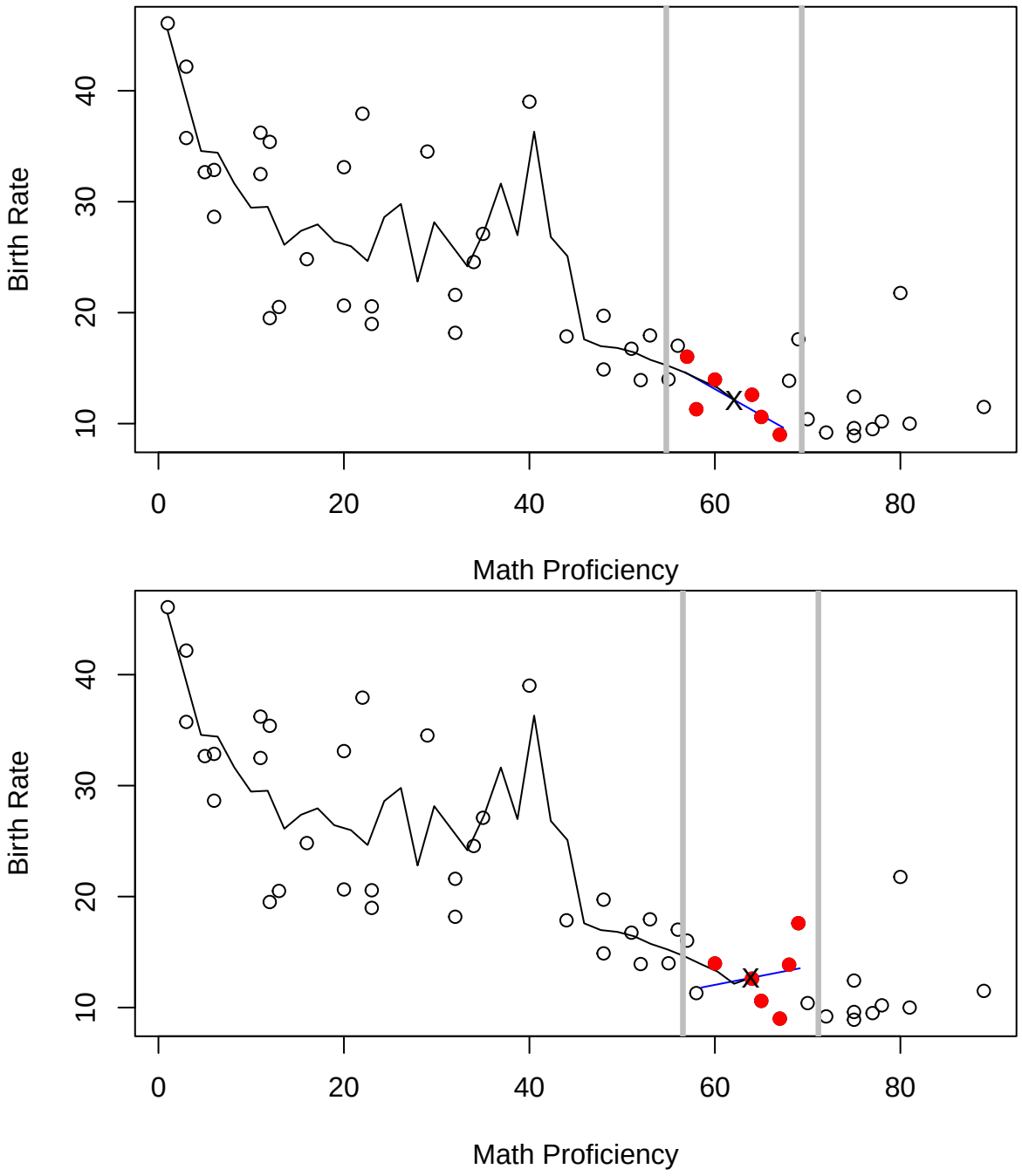
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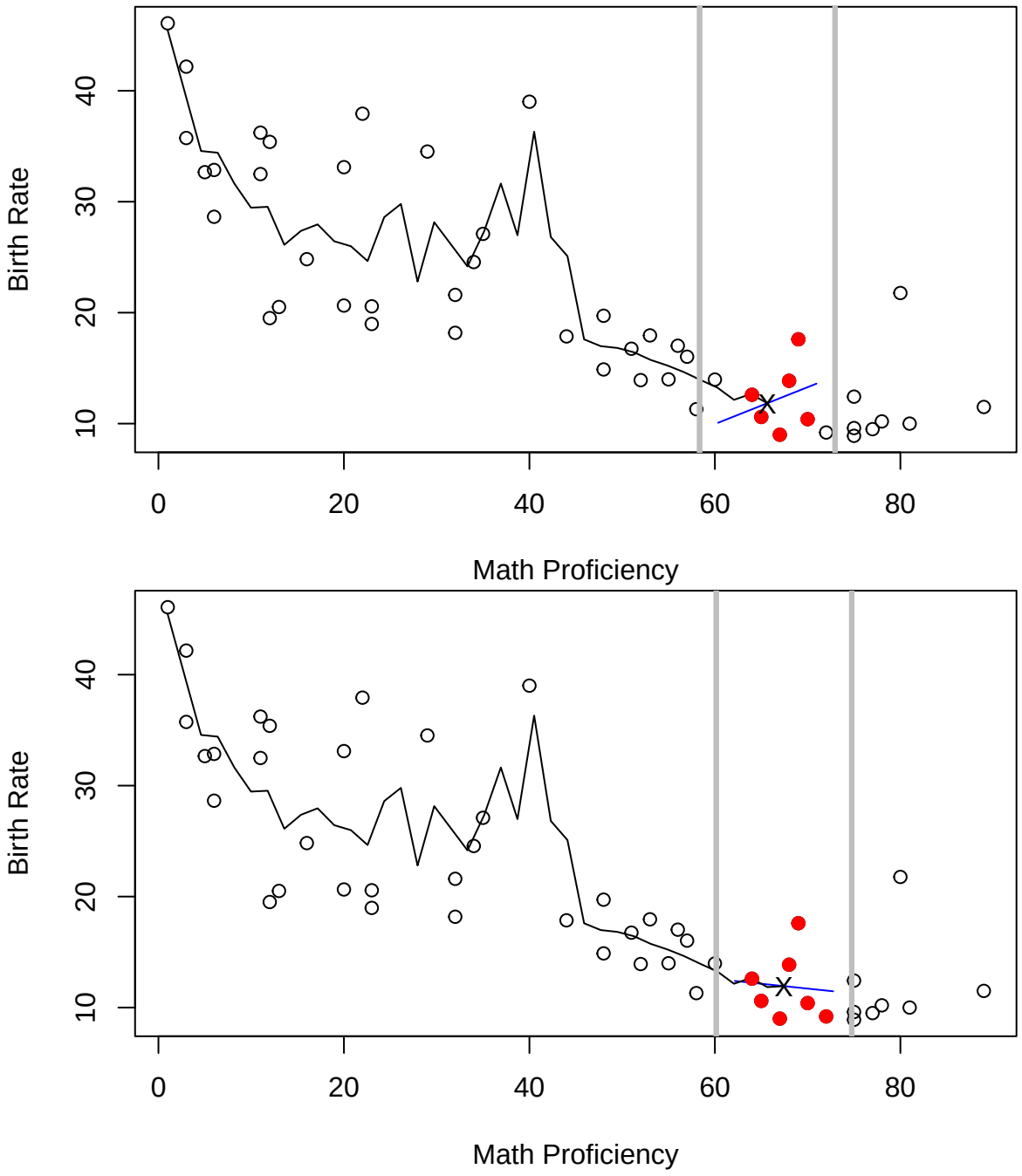
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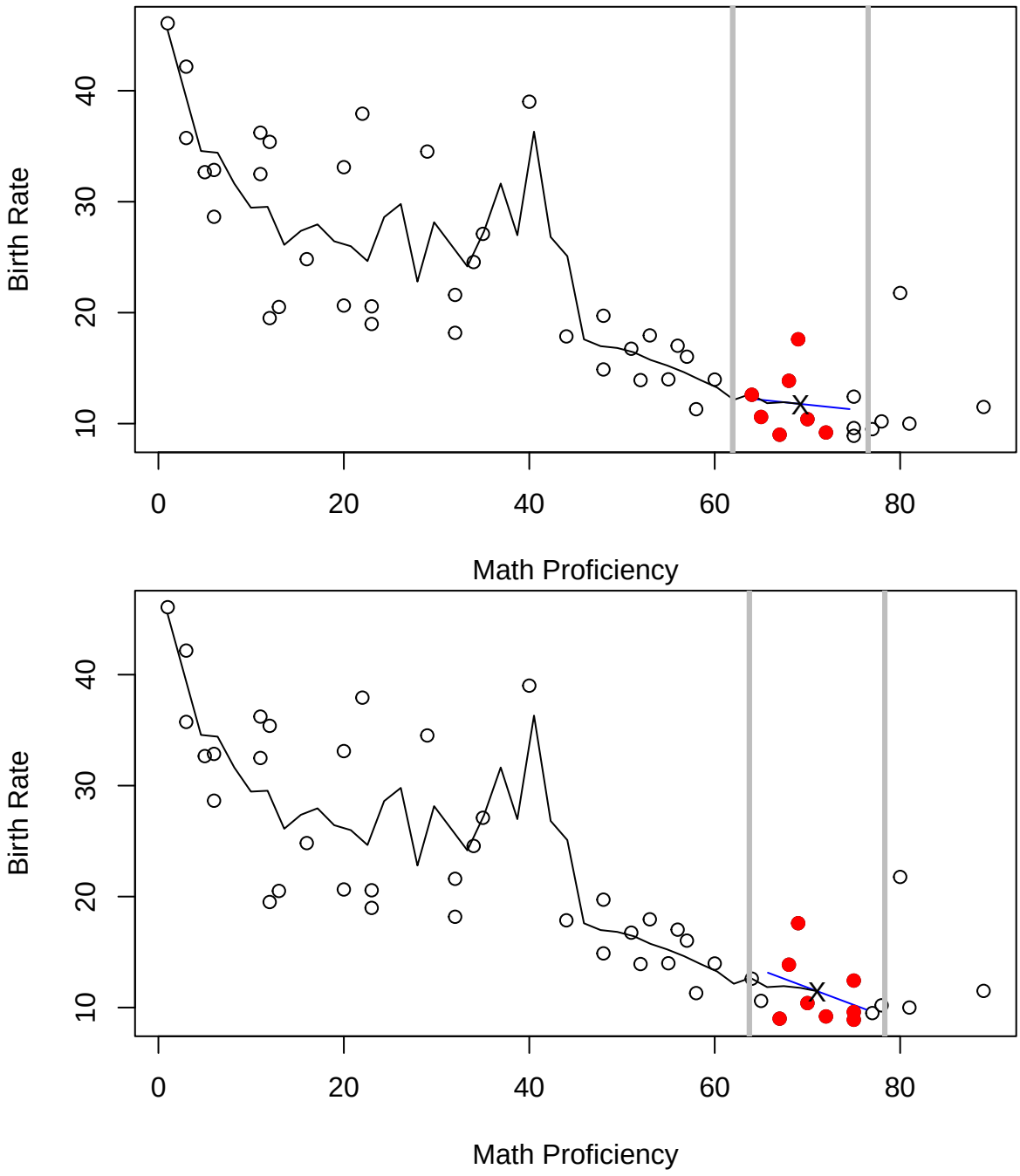
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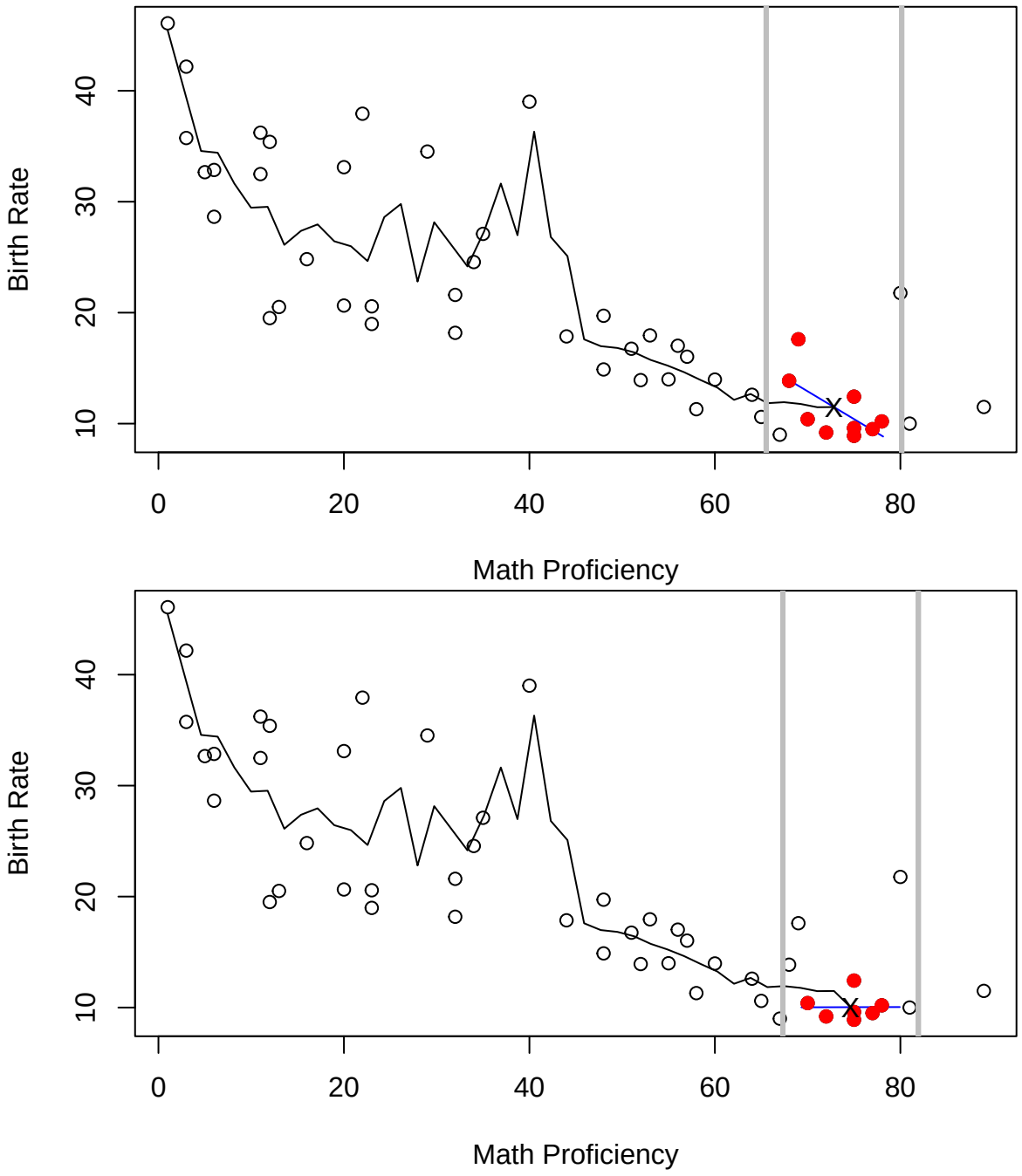
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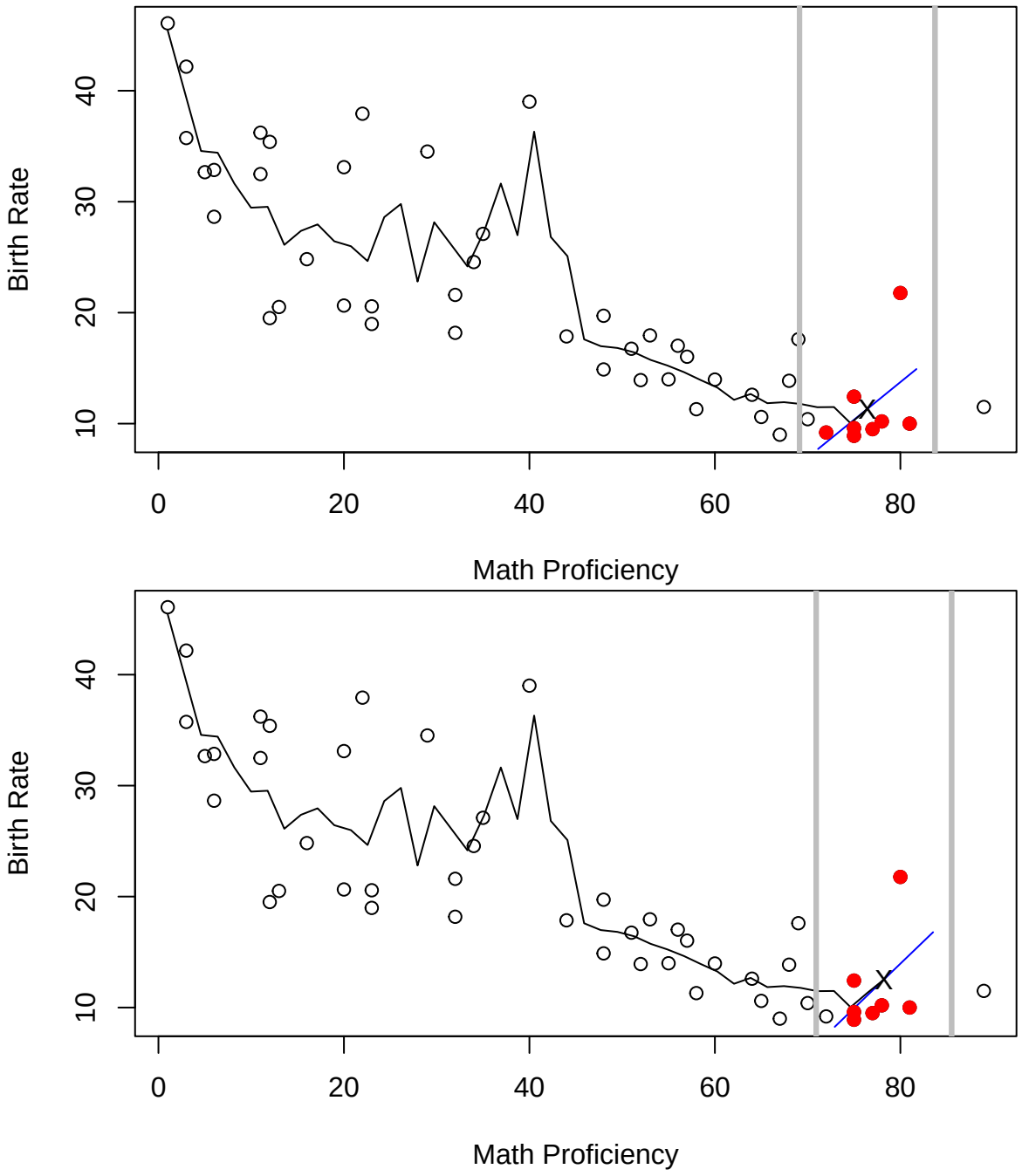
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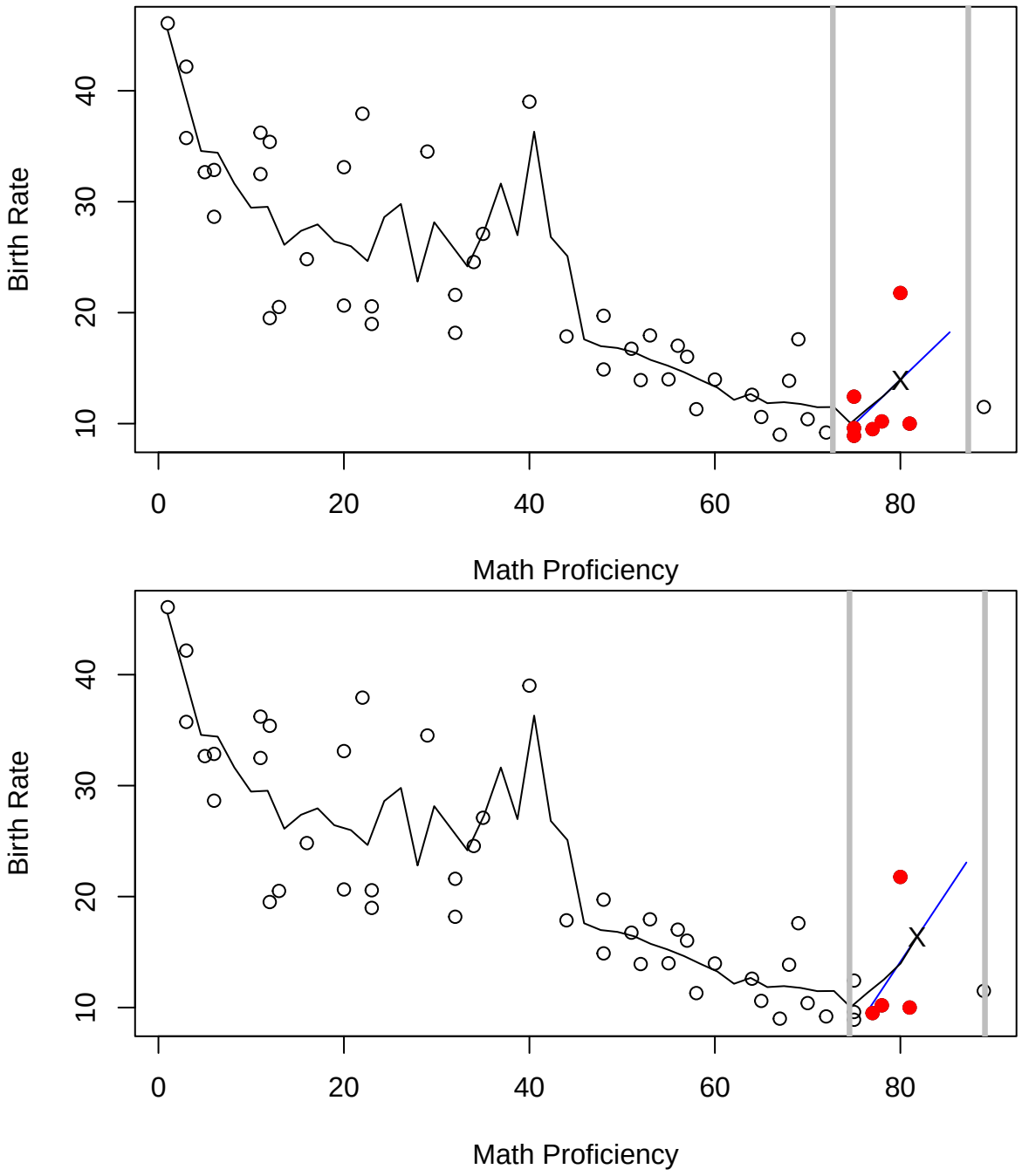
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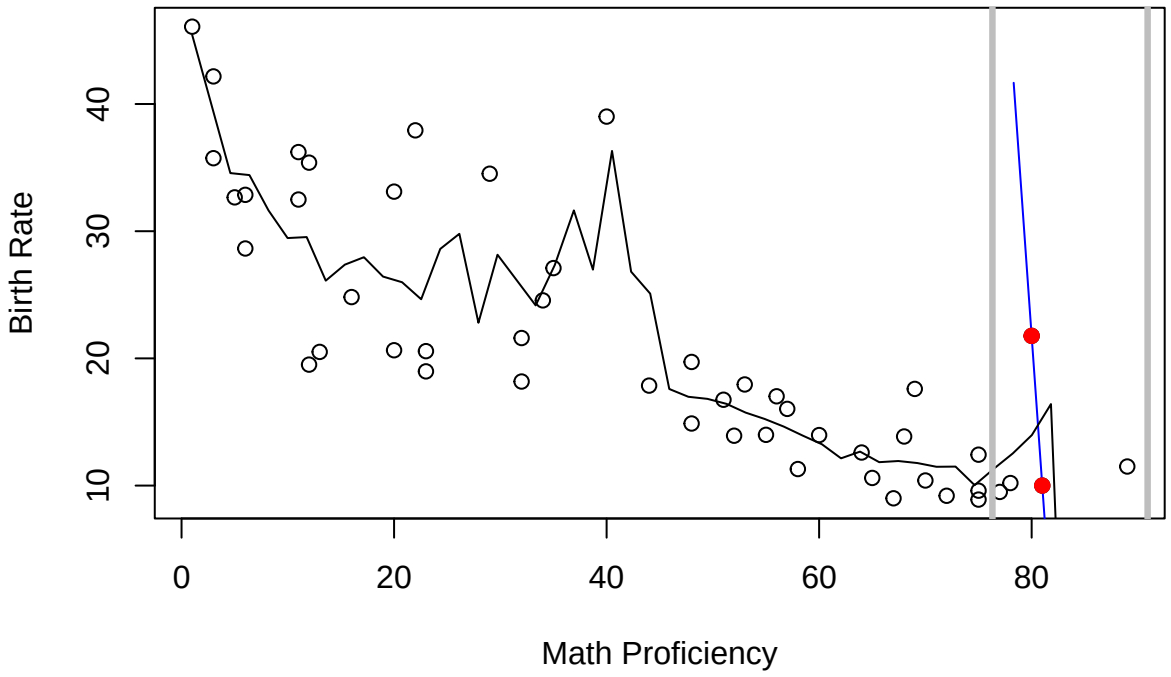
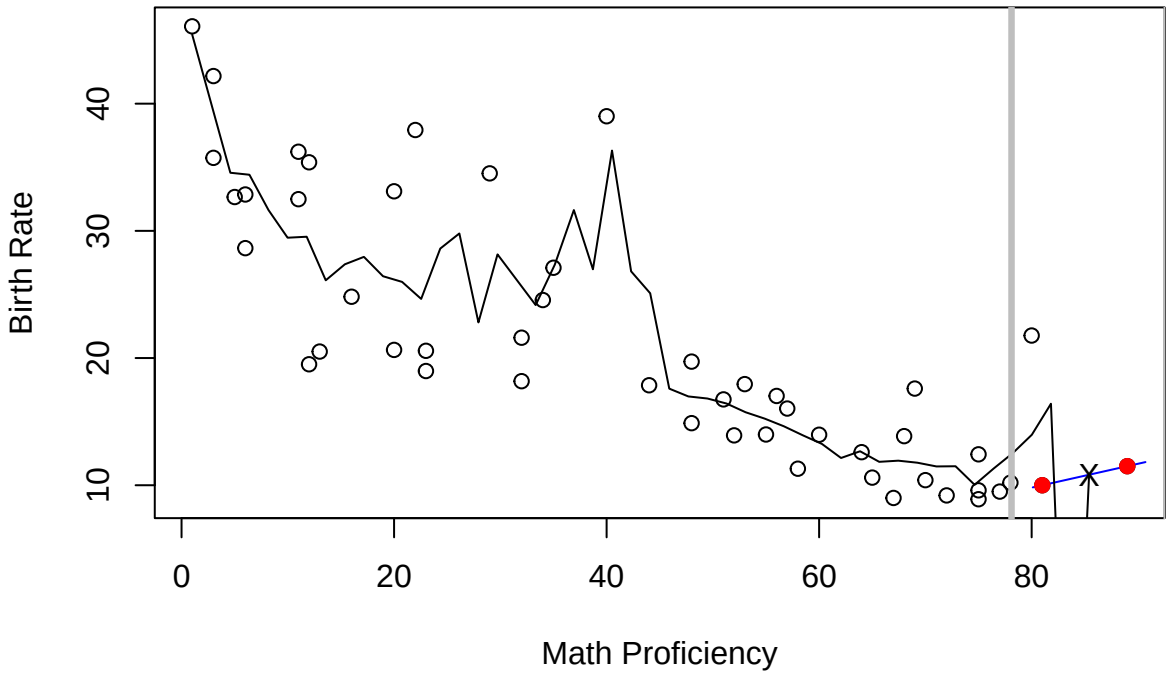



```
## Warning in predict.lm(lm(ynew ~ xnew), newdata = xpred): prediction from
## rank-deficient fit; attr(*, "non-estim") has doubtful cases
```

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## Warning in predict.lm(lm(ynew ~ xnew), newdata = xpred): prediction from
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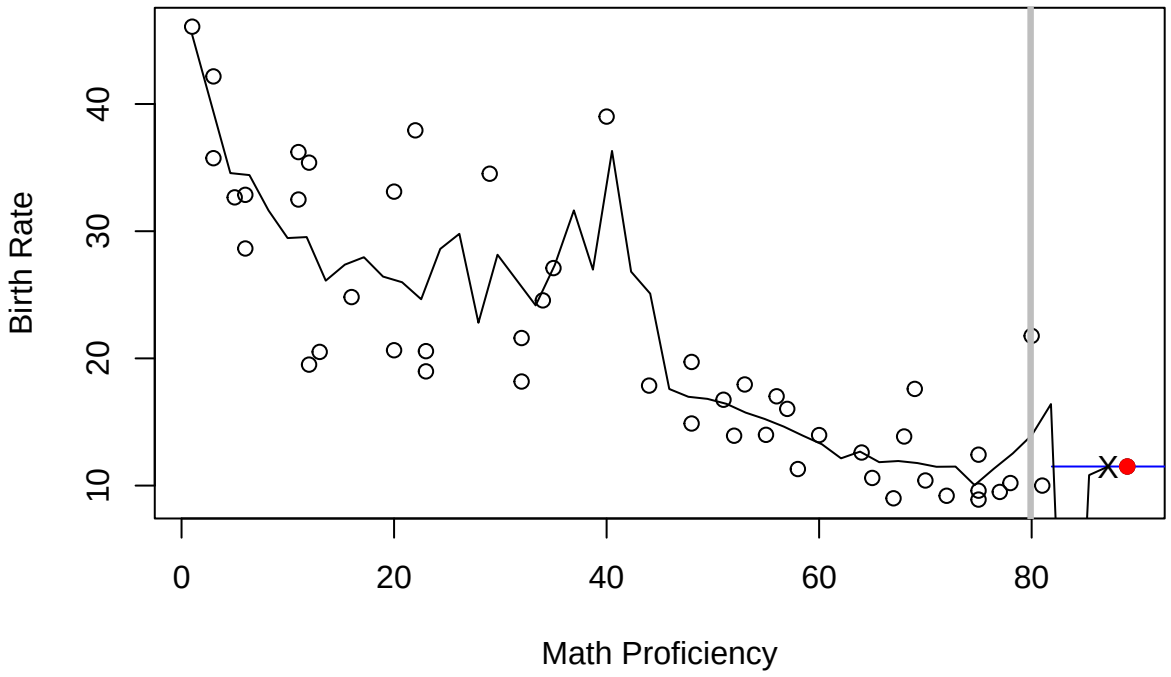


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## Warning in predict.lm(lm(ynew ~ xnew), newdata = xpred): prediction from
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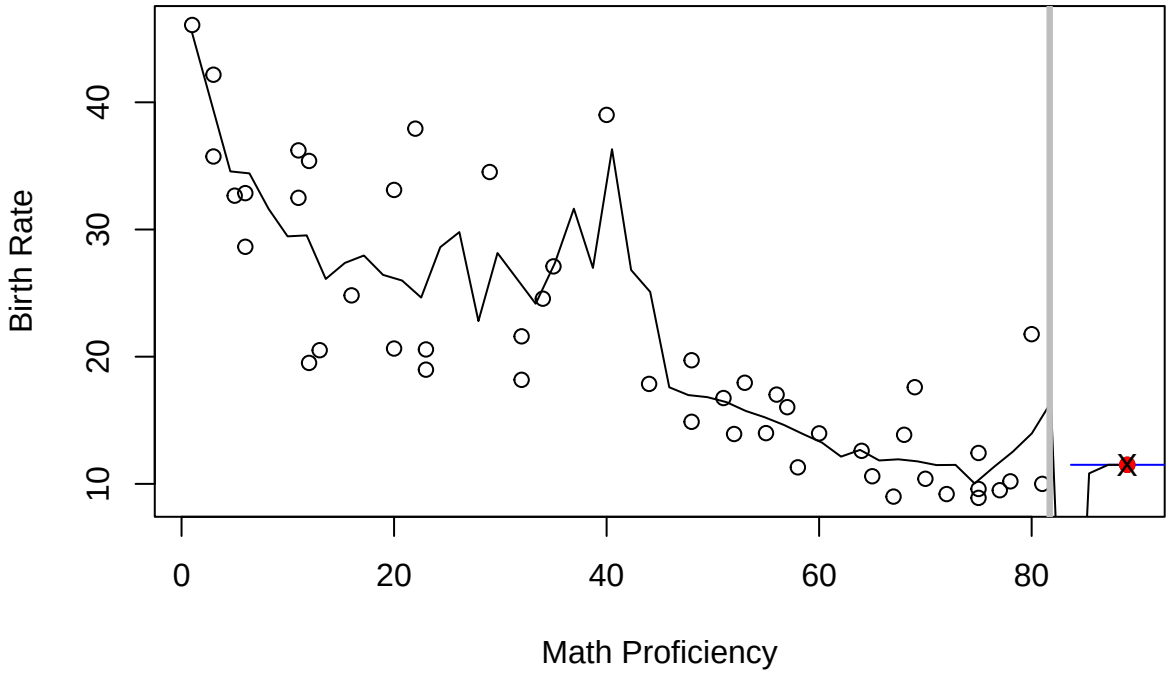
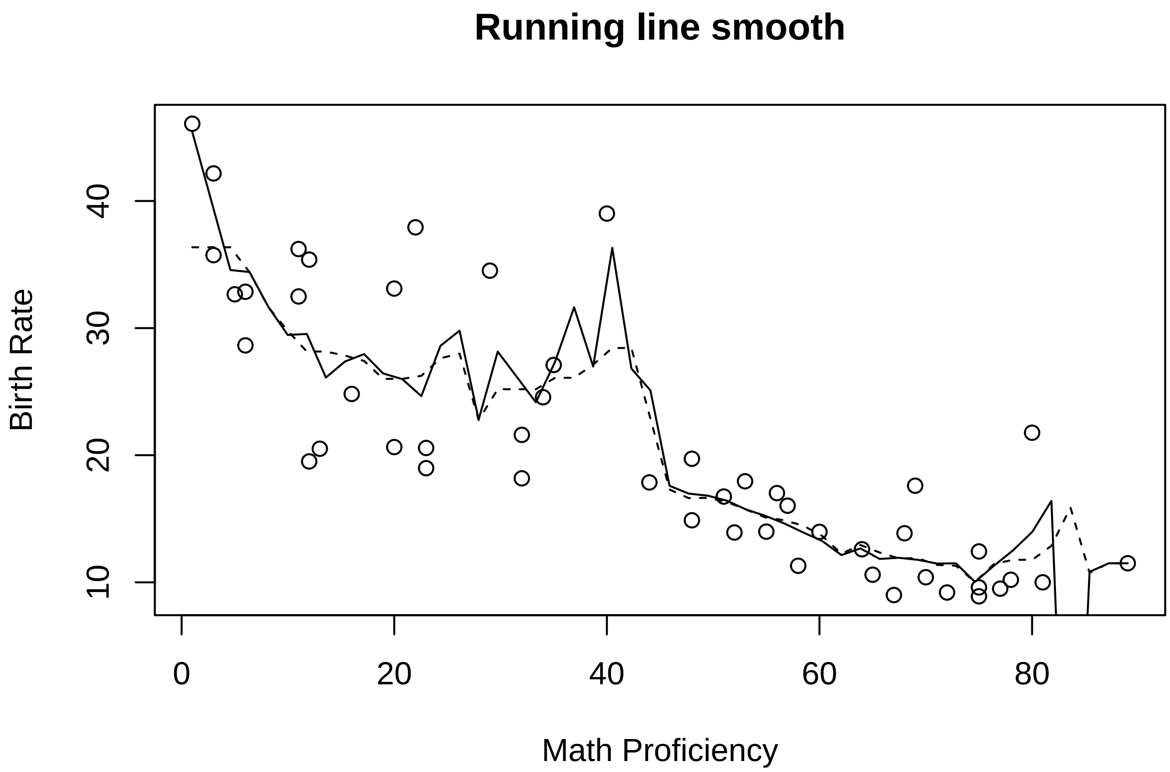



```
ani.options(oopt)
# final static image to present after animation
plot(filtered_math, filtered_birth,
    xlab="Math Proficiency", ylab="Birth Rate", main="Running line smooth")
lines(rls$xs, rls$ys)
```

```r
lines(rms(filtered_math,filtered_birth, optimalbw), lty=2)
```




```r
saveHTML(rlsani(filtered_math,filtered_birth,optimalbw,1), htmlfile="~/Documents/SDSU /Stat580/FinalPro
```

```
## Warning in predict.lm(lm(ynew ~ xnew), newdata = xpred): prediction from
## rank-deficient fit; attr(*, "non-estim") has doubtful cases

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## HTML file created at: ~/Documents/SDSU /Stat580/FinalProject/rlsani.html
```