

## week\_5\_lab

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### Question 1

We don't want to compare all students who are on probation with all students who are not on probation because the students at the top end of the GPA threshold are different in many aspects than students at the bottom end of the GPA threshold. As such, the underlying assumption that the control and treatment groups are comparable would not hold.

### Question 2

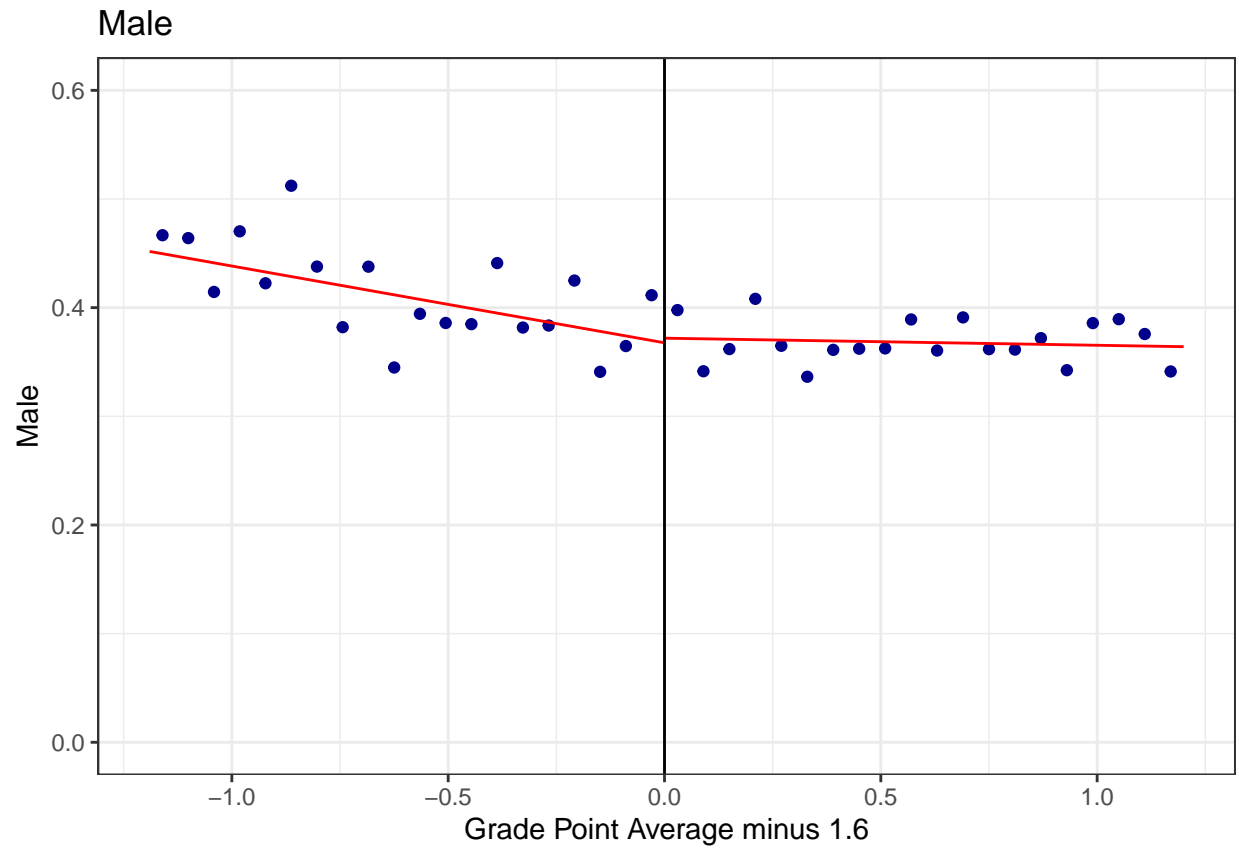
The running variable is GPA average

### Question 3

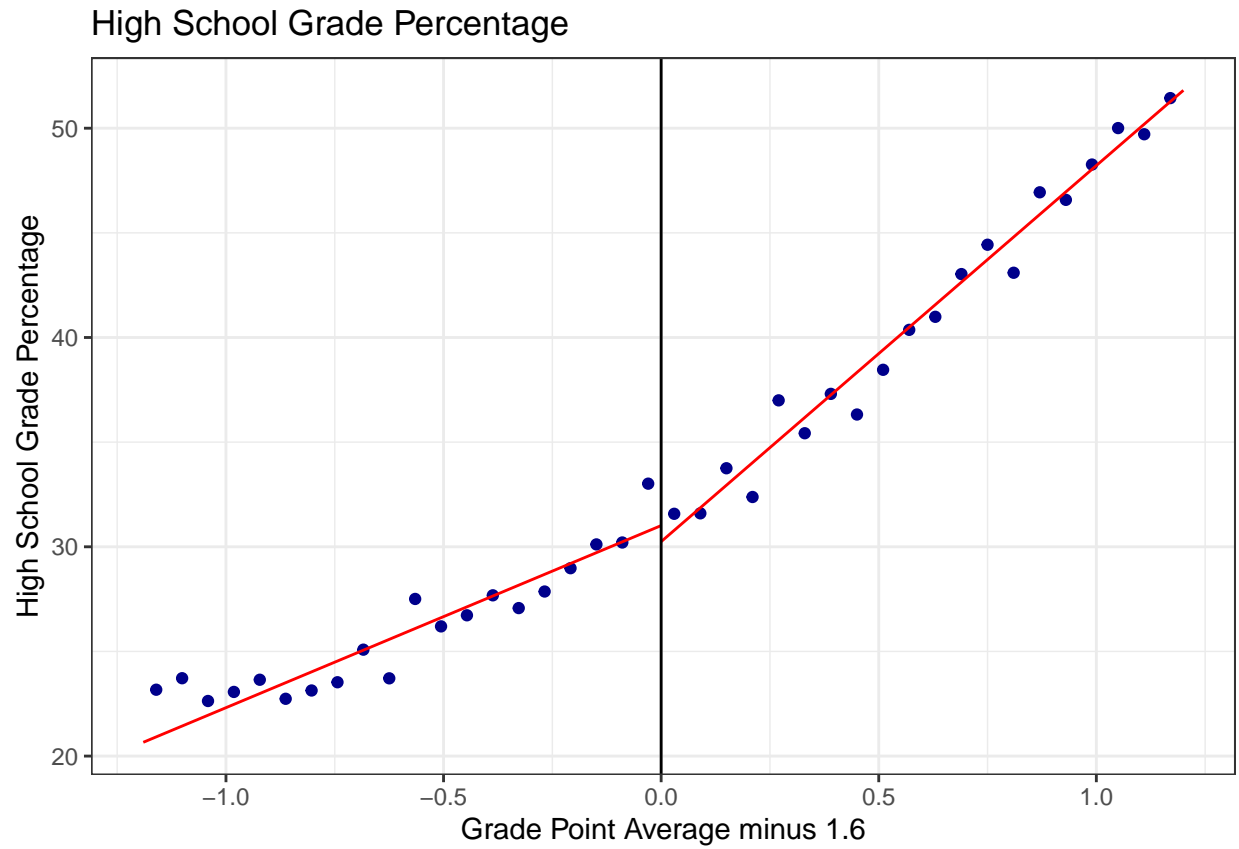
#### Part a

The graphs below check the smoothness of fraction graduating in 4 years, male, and high school grade percentage. There doesn't appear to be a large break in any of these variables at the GPA threshold, meaning that it doesn't seem like any of these factors are driving the differences in the groups.

```
## [1] "Mass points detected in the running variable."
```



```
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```

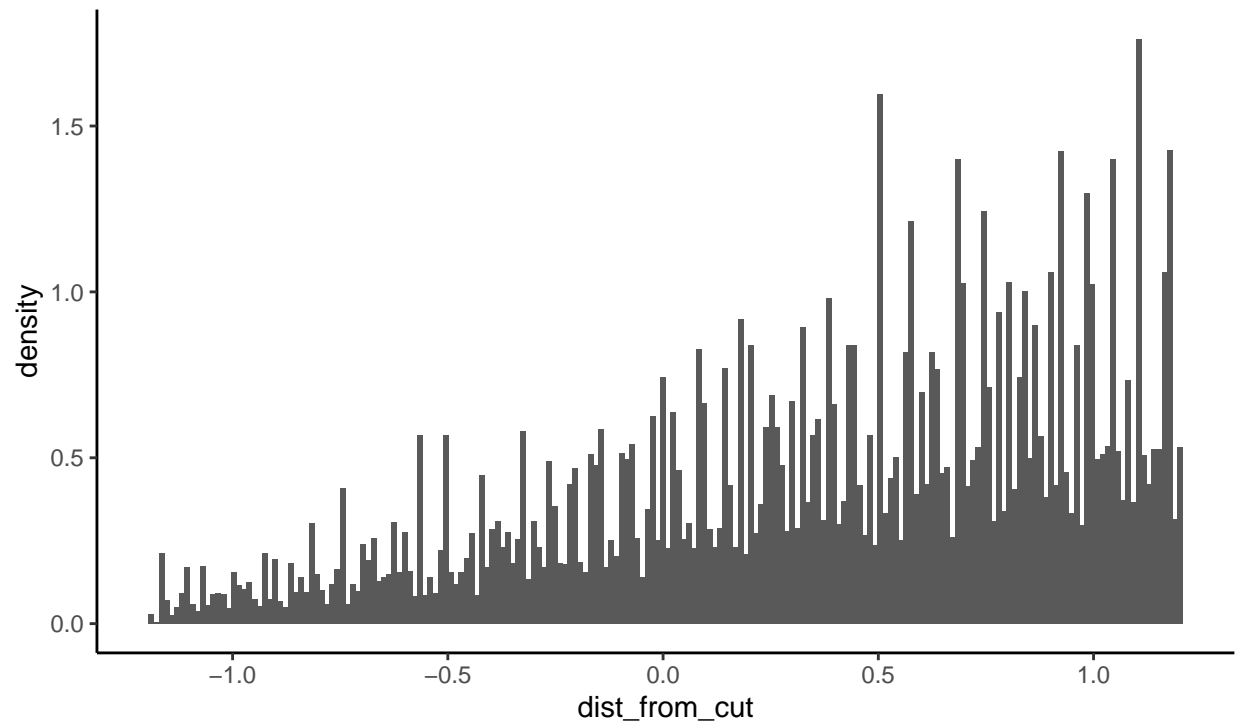


#### Part b

There doesn't appear to be a spike in the density of observations just above the GPA threshold.

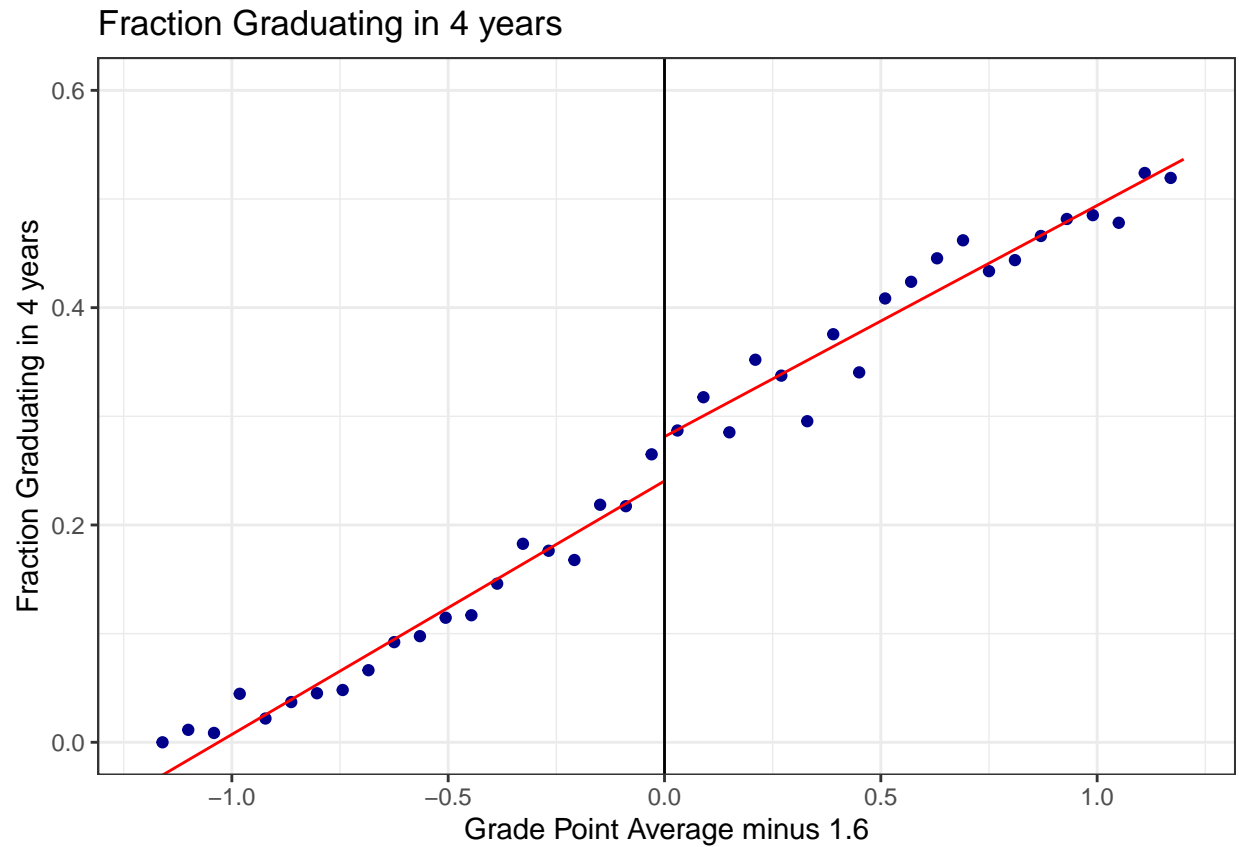
### Distribution of dist\_from\_cut

There doesn't appear to be a spike in density just above the cutoff



### Question 4

```
## [1] "Mass points detected in the running variable."
```



### Question 5

- a) 0.24058
- b) 0.281278
- c) The difference between b and a, or the predicted effect = 0.040698

### Question 6

```
##
## t test of coefficients:
##
##           Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.2404832  0.0099183  24.2465 < 2.2e-16 ***
## T           0.0407903  0.0132494   3.0786  0.002083 **
## dist_from_cut 0.2332585  0.0139726  16.6940 < 2.2e-16 ***
## interaction  -0.0204812  0.0185736  -1.1027  0.270169
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

The coefficient for T equals the answer in 5c.

### Question 7

The standard error for the coefficient = .013. Because  $.0407 \pm 1.96 \cdot .013$  does not include 0, we can conclude that the effect is statistically significant at the 95% confidence level.

### Question 8

Because the effect of the T coefficient is positive and statistically significant, we can see that kids who received probation are graduating at a slower rate than kids who did not receive probation. As such, we can conclude the school's probation policy was effective in a sense that it punished kids below the threshold. However, it was not effective at improving their academic outcomes when measured with graduation rates. With this being said, the effect (.04) is very small, so while we can claim that it is statistically significant, in my opinion, it does not seem substantively significant and is certainly not deterministic of any one student's academic outcomes.