hw2 q17

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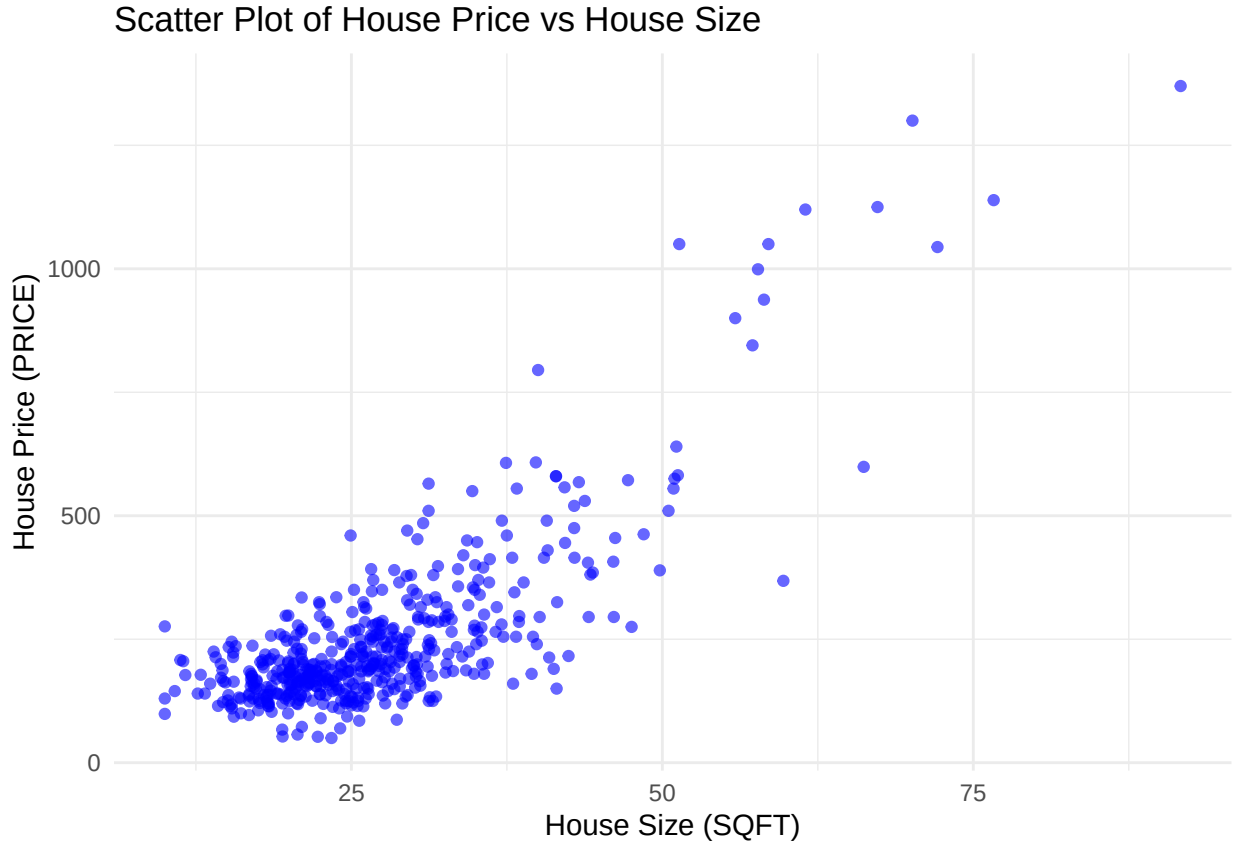
'##



qn17: a:
the trend is upward... implying larger houses tends to have higher prices, not a surprise

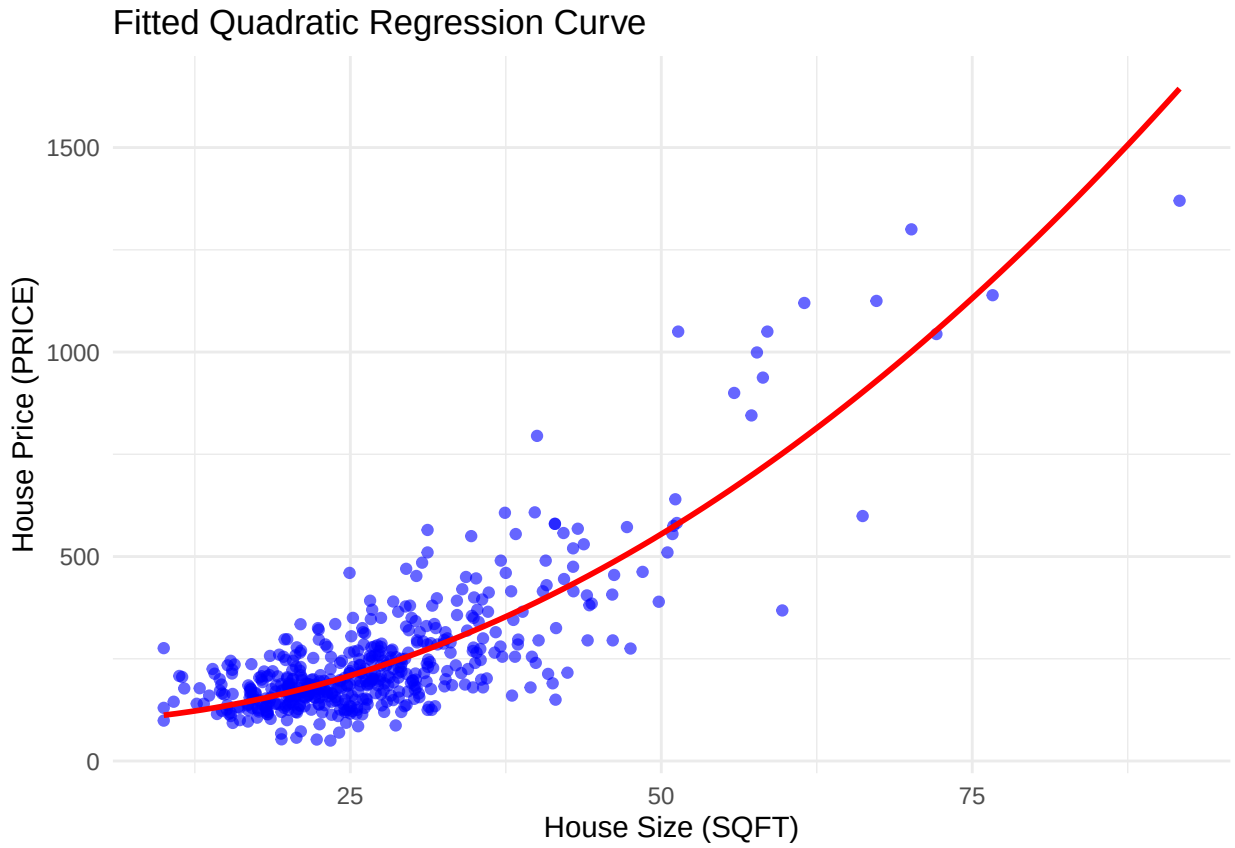
```
##
## Call:
## lm(formula = price ~ sqft, data = data)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -316.93  -58.90   -3.81   47.94  477.05
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -115.4236    13.0882  -8.819   <2e-16 ***
```

```
## sqft          13.4029     0.4492  29.840   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 102.8 on 498 degrees of freedom
## Multiple R-squared:  0.6413, Adjusted R-squared:  0.6406
## F-statistic: 890.4 on 1 and 498 DF,  p-value: < 2.2e-16
```

b:as per beta by above summary, the linear regression model price=B1+B2sqft+e: price=-115.42+13.40sqft. which implies that a house the size of 0sqft… will start off at -115423.6 dollars, and when everything is constant, 100 sqft increase in house size will cause the price to raise by 13402 dollars.

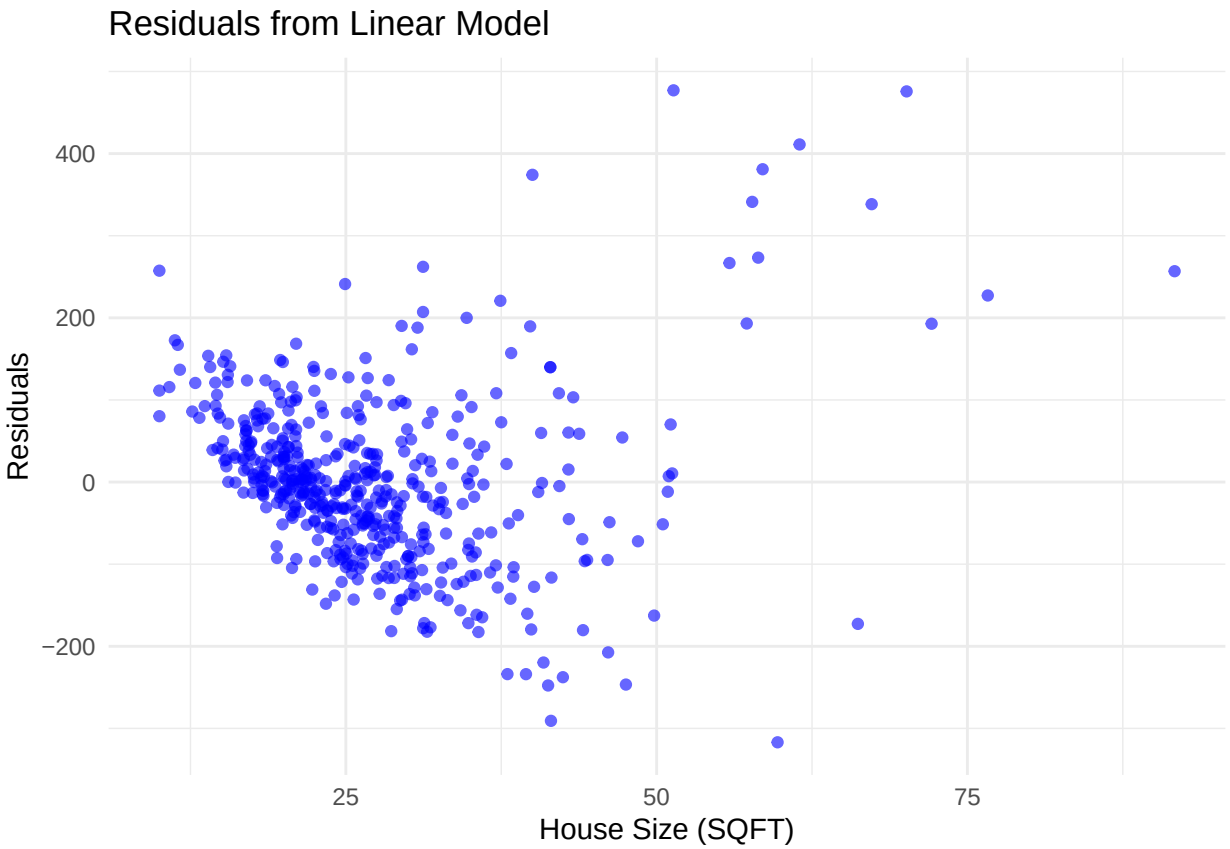
```
##
## Call:
## lm(formula = price ~ I(sqft^2), data = data)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -383.67  -48.39   -7.50   38.75  469.70
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) 93.565854   6.072226   15.41   <2e-16 ***
## I(sqft^2)    0.184519   0.005256   35.11   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

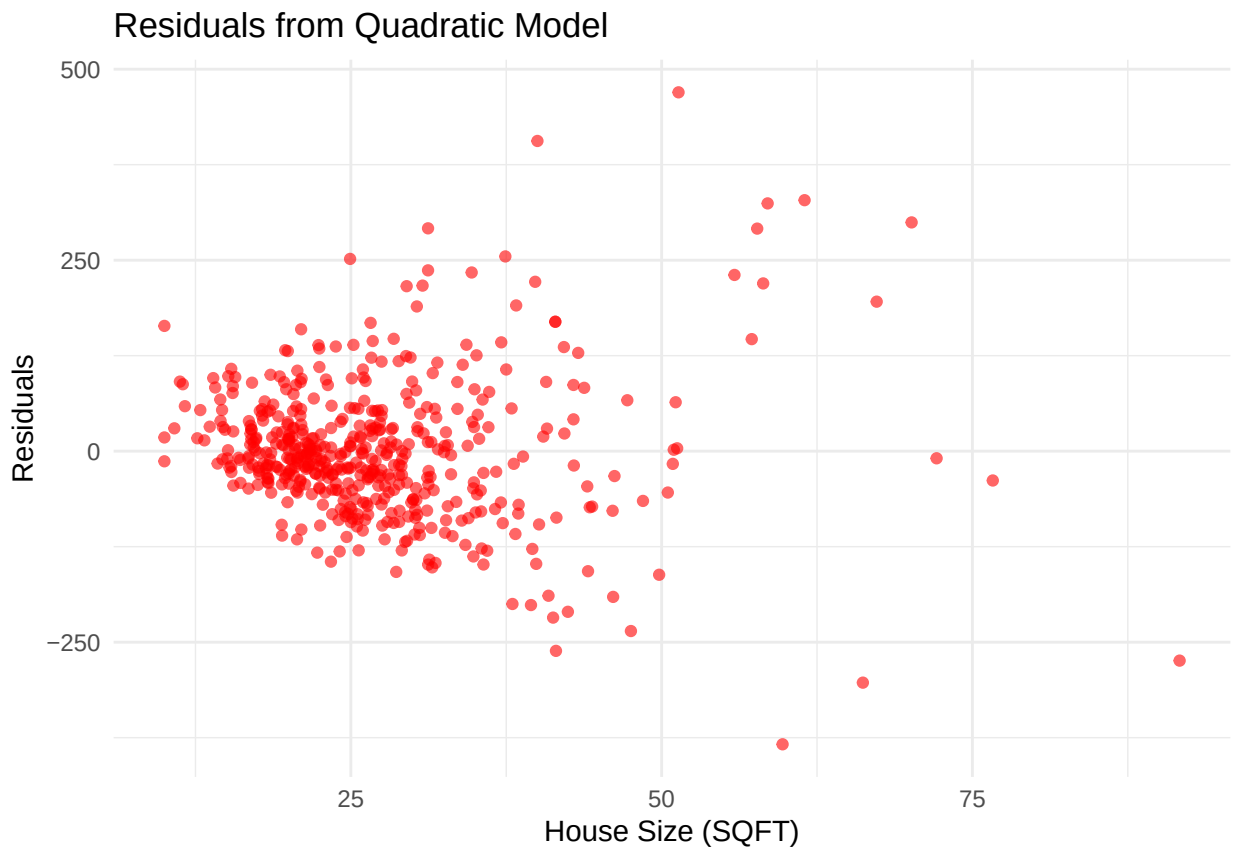
```
##
## Residual standard error: 92.08 on 498 degrees of freedom
## Multiple R-squared:  0.7122, Adjusted R-squared:  0.7117
## F-statistic:  1233 on 1 and 498 DF,  p-value: < 2.2e-16
```



c:for price=a1+a2(sqft^2)+e, price=93.57+0.185(sqft^2) the marginal effect for 20k sqft is 2(a2)sqft = 2(0.185)20^2 = 7.4 (about)

d: as shown above e: elasticity = (price/ sqft)(sqft/price) = 2(0.185)(20)(20)/(93.57+0.185(20^2))=0.8832


Residuals from Linear Model
Residuals
400
200
0
−200
25
50
75
House Size (SQFT)



f:it seems like in the plots the residual variation increases with the x axis for both the models which likely violates homoskedasticity.

```
## Linear Model SSE: 5262847
```

```
## Quadratic Model SSE: 4222356
```

g:the modle from c has a lower sse, and this implies the data is closer to the fitted line of the quadratic model in this case.