Log Transformation Justification:

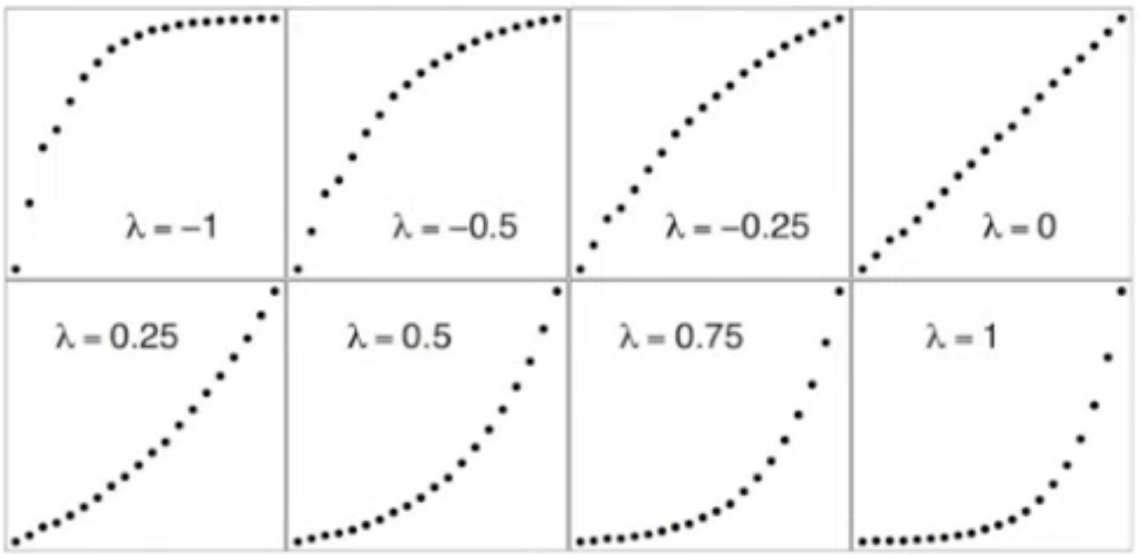
Intro to Tukey's Ladder of Powers

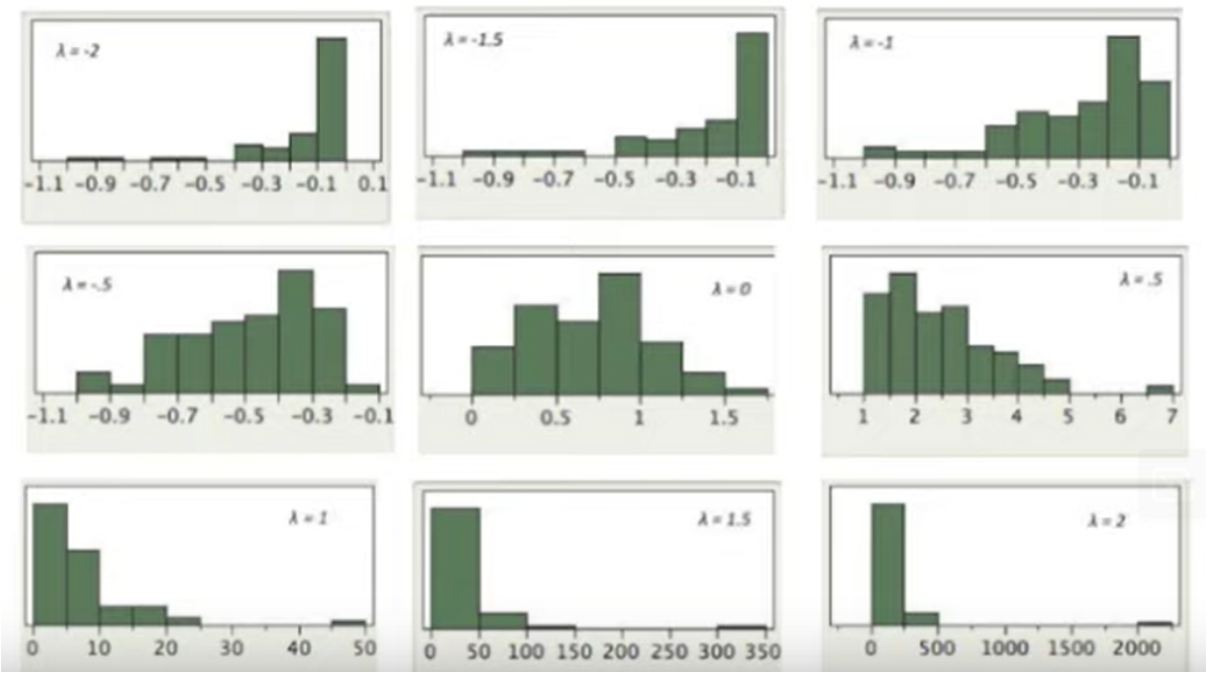
- x is original data
- y is transformed data
- $y = x^{\lambda}$

Values of λ:
-2, -1, -.5, 0, .5, 1, 2

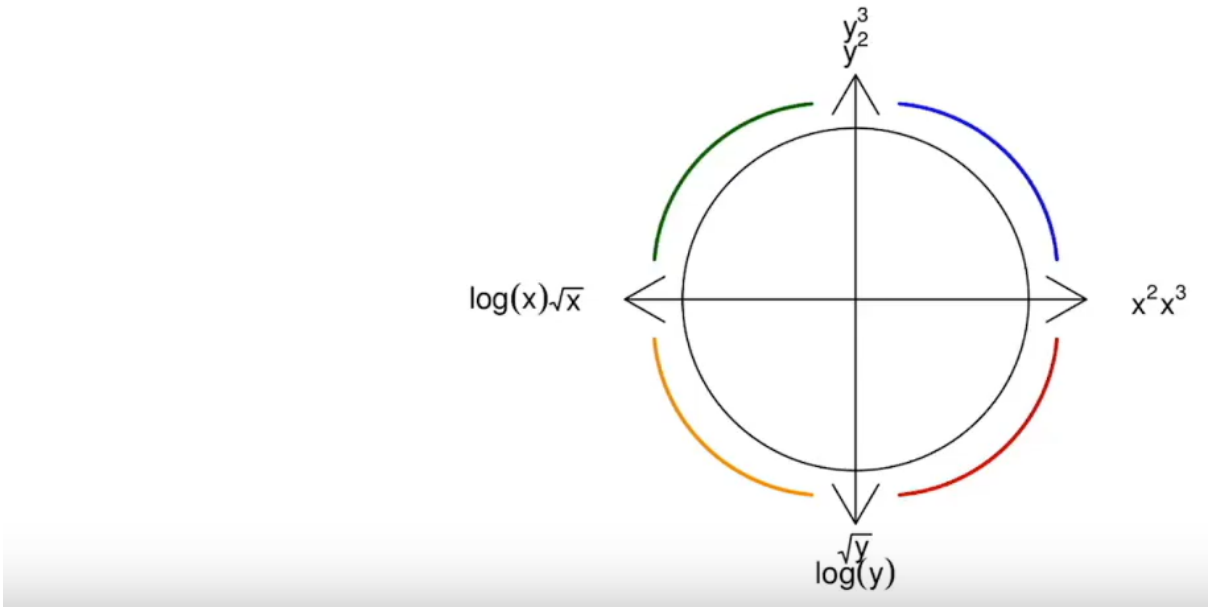
The Ladder

λ	-2	-1	-1/2	0	1/2	1	2
y	$\frac{1}{x^2}$	$\frac{1}{x}$	$\frac{1}{\sqrt{x}}$	$\log x$	$\sqrt{x}$	x	x^2


λ = −1
λ = −0.5
λ = −0.25
λ = 0
λ = 0.25
λ = 0.5
λ = 0.75
λ = 1


λ = -2
-1.1 -0.9 -0.7 -0.5 -0.3 -0.1 0.1
λ = -1.5
-1.1 -0.9 -0.7 -0.5 -0.3 -0.1
λ = -1
-1.1 -0.9 -0.7 -0.5 -0.3 -0.1
λ = -.5
-1.1 -0.9 -0.7 -0.5 -0.3 -0.1
λ = 0
0 0.5 1 1.5
λ = .5
1 2 3 4 5 6 7
λ = 1
0 10 20 30 40 50
λ = 1.5
0 50 100 150 200 250 300 350
λ = 2
0 500 1000 1500 2000

Tukey's bulging rule



In [195]:
```
predictions = model.predict(X_test)

residuals = y_test - predictions

plt.scatter(predictions, residuals)
plt.axhline(y=0, color='r', linestyle='--')
plt.xlabel('Fitted values')
plt.ylabel('Residuals')
plt.title('Residual vs Fitted Plot')
plt.show()
```