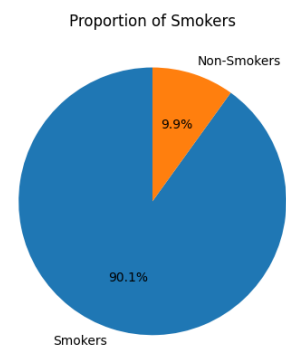
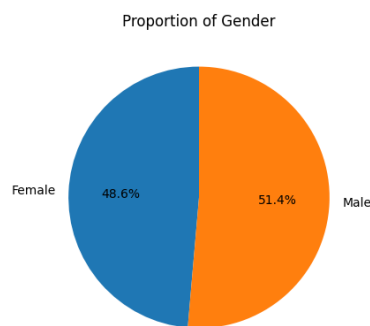
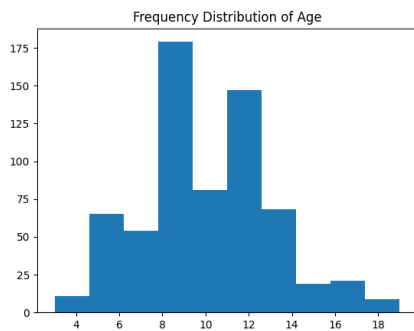
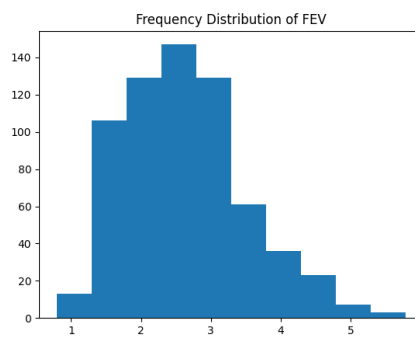
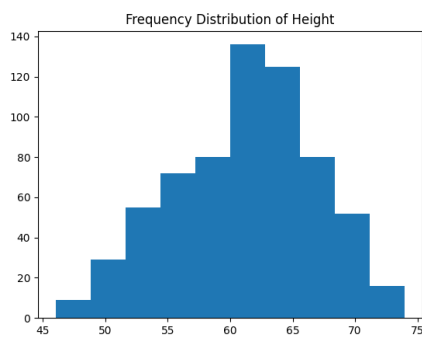


## Problem 1

### 1. Numeric Statistics

	Id	Age	FEV	Hgt	Sex	Smoke
count	654	654	654	654	654	654
mean	37169.57	9.931193	2.63678	61.14358	0.513761	0.099388
std	23690.86	2.953935	0.867059	5.703513	0.500193	0.299412
min	201	3	0.791	46	0	0
25%	15811	8	1.981	57	0	0
50%	36071	10	2.5475	61.5	1	0
75%	53638.5	12	3.1185	65.5	1	0
max	90001	19	5.793	74	1	1

### 1. Visual Statistics



## 2. Numeric Stats – Correlation values

Male FEV by Age: 0.81

Female FEV by Age: 0.74

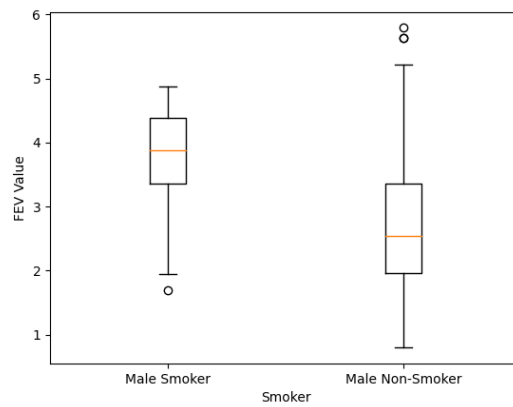
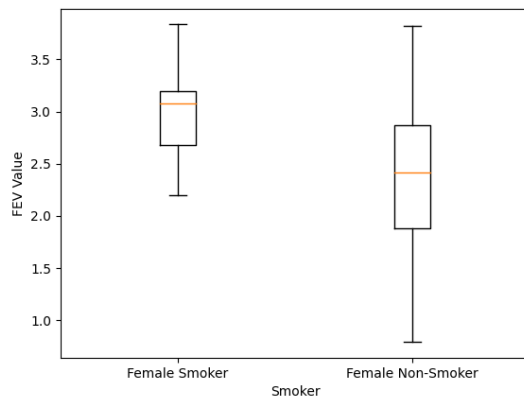
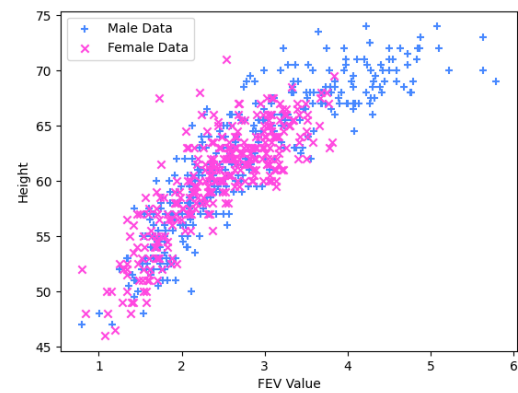
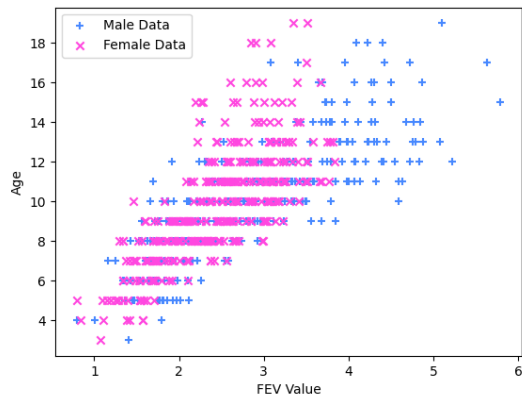
Male FEV by Height: 0.88

Female FEV by Height: 0.74

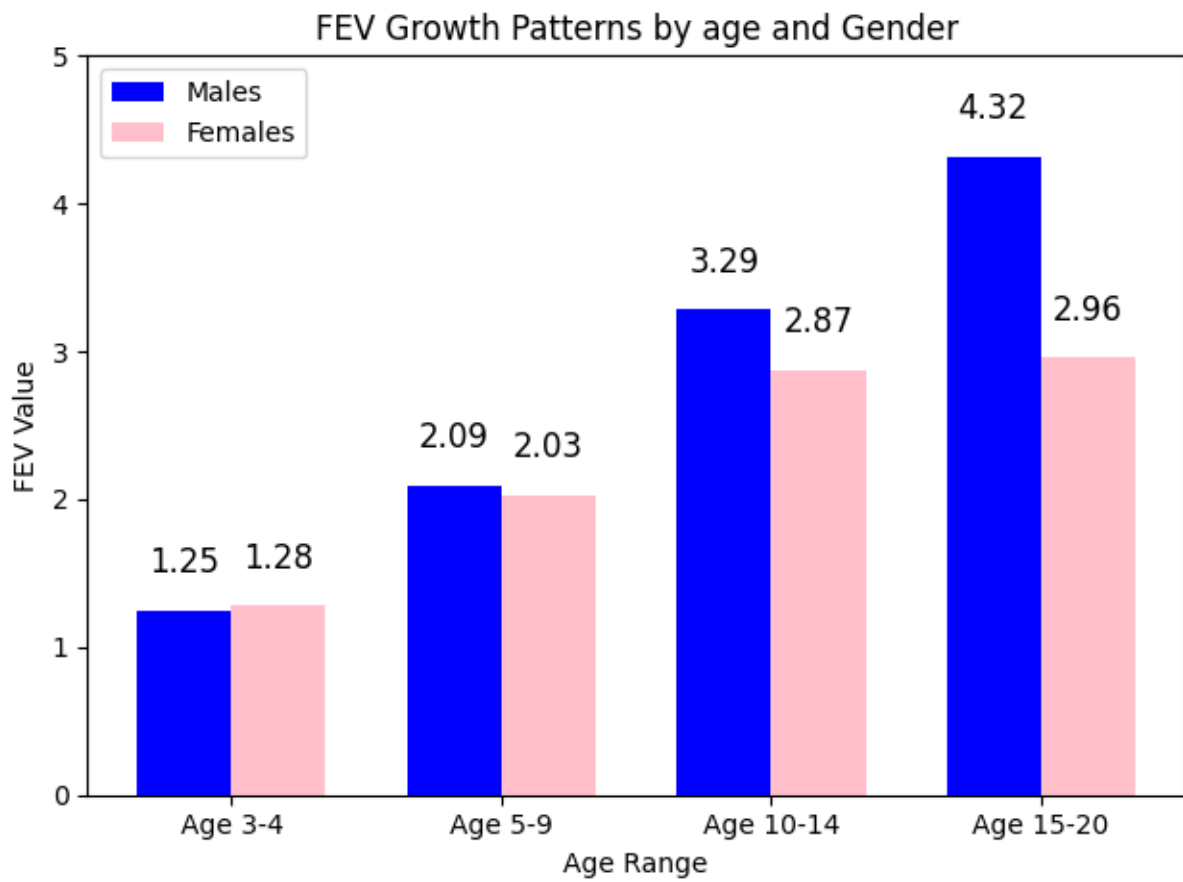
Male FEV by Smoker Status: 0.27

Female FEV by Smoker Status: 0.3

## 2. Visual Statistics



### 3. Graph



## Problem 2

### 1. Descriptive Statistics for Lumbar Spine (Whole pop):

count	41.000000
mean	10.598632
std	8.112226
min	1.047120
25%	5.333333
50%	8.791209
75%	12.631579
max	38.095238

### 2. By Number of Packs

#### 0-10 Packs

count	7.000000
mean	6.604708
std	4.672456
min	3.174603
25%	3.470063
50%	6.289308
75%	6.627167
max	16.574586

#### 10-20 Packs

count	14.000000
mean	9.228019
std	4.767045
min	1.047120
25%	5.592357
50%	10.711665
75%	12.320484
max	16.774194

### **20-30 Packs**

count 8.000000  
mean 14.359514  
std 12.701486  
min 1.169591  
25% 4.663409  
50% 11.515820  
75% 18.804810  
max 38.095238

### **30-40 Packs**

count 6.000000  
mean 8.300975  
std 2.885653  
min 4.938272  
25% 6.290567  
50% 7.964669  
75% 9.921764  
max 12.631579

### **40+ Packs**

count 6.000000  
mean 15.739454  
std 10.896136  
min 6.185567  
25% 9.371184  
50% 11.871345  
75% 18.022760  
max 35.897436

### **Statistics for Femoral Neck (Whole Population)**

count 41.000000  
mean 11.081017  
std 8.655775  
min 0.000000  
25% 5.555556  
50% 7.874016  
75% 14.492754  
max 34.782609

### **0-10 Packs**

count 7.000000  
mean 10.516364  
std 5.098924  
min 2.941176  
25% 7.013931  
50% 11.320755  
75% 14.211675  
max 16.901408

### **10-20 Packs**

count 14.000000  
mean 11.185510  
std 10.352877  
min 0.000000  
25% 5.595238  
50% 7.409034  
75% 15.662100  
max 34.482759

### **20-30 Packs**

count 8.000000

mean 9.476040  
std 7.381769  
min 1.574803  
25% 4.781102  
50% 8.598108  
75% 10.689768  
max 25.806452

### **30-40 Packs**

count 6.000000  
mean 10.854535  
std 8.439655  
min 3.389831  
25% 5.003524  
50% 6.967311  
75% 17.925951  
max 21.875000

### **40+ Packs**

count 6.000000  
mean 13.862415  
std 11.315890  
min 2.061856  
25% 7.599562  
50% 12.813046  
75% 14.334912  
max 34.782609

### **Statistics for Femoral Shaft (Whole Population)**

count 41.000000  
mean 8.834949  
std 7.643036  
min 0.873362  
25% 3.921569  
50% 7.812500  
75% 10.434783  
max 44.680851

### **0-10 Packs**

count 7.000000  
mean 6.819471  
std 2.388911  
min 2.739726  
25% 5.611806  
50% 7.207207  
75% 8.475185  
max 9.615385

### **10-20 Packs**

count 14.000000  
mean 5.389898  
std 3.302586  
min 0.956938  
25% 3.524436  
50% 4.125286  
75% 7.329963  
max 13.793103

### **20-30 Packs**

count 8.000000



mean 11.174710  
std 6.036175  
min 0.873362  
25% 8.259268  
50% 10.020885  
75% 15.649351  
max 19.895288

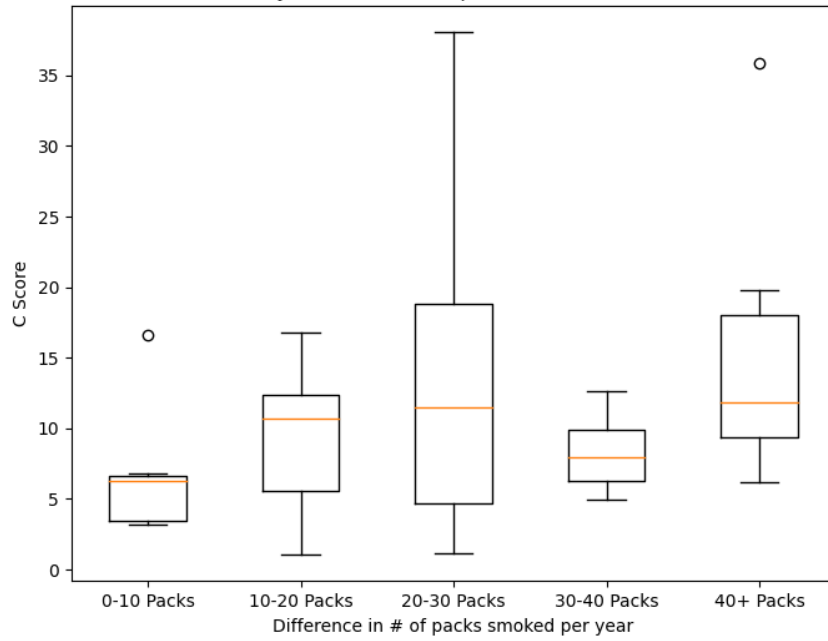
#### **30-40 Packs**

count 6.000000  
mean 9.351471  
std 4.584117  
min 2.870813  
25% 5.879756  
50% 10.979204  
75% 12.875375  
max 13.592233

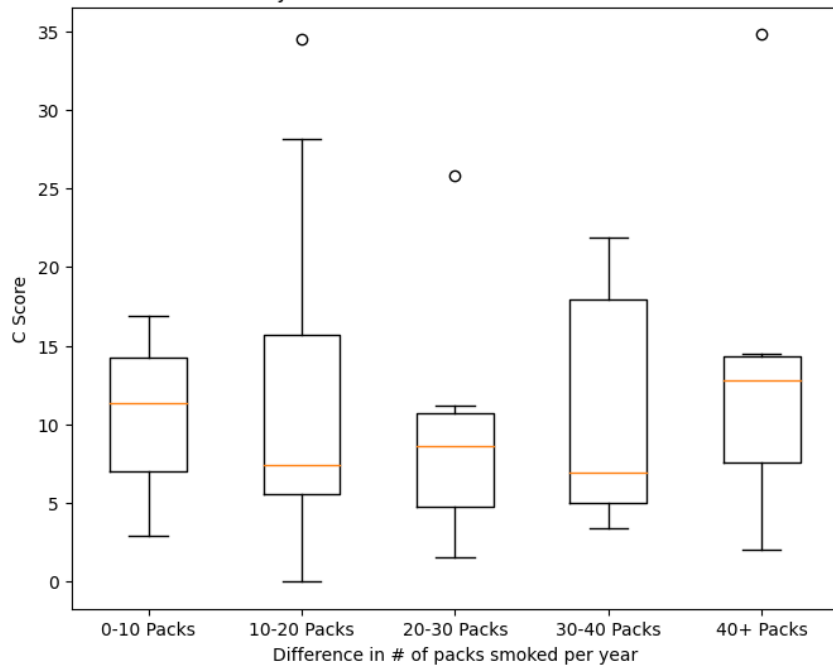
#### **40+ Plus Packs**

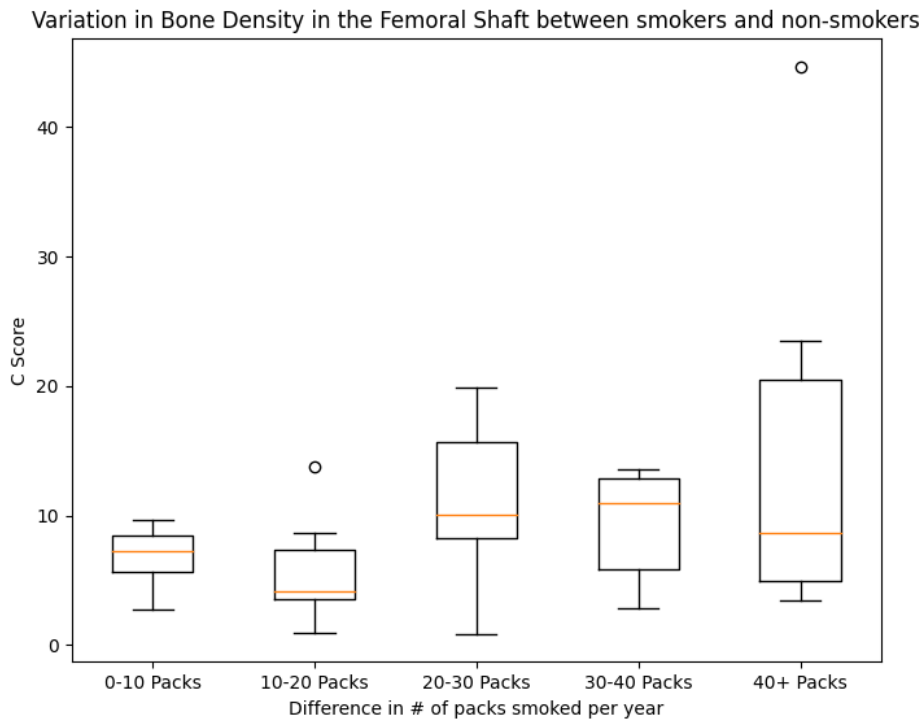
count 6.000000  
mean 15.588585  
std 16.042626  
min 3.428571  
25% 4.980060  
50% 8.643156  
75% 20.443350  
max 44.680851

Variation in Bone Density in the Lumbar Spine between smokers and non-smokers



Variation in Bone Density in the Femoral Neck between smokers and non-smokers





From all three graphs, it appears that the variance in C Scores generally gets wider as the difference between each twin gets higher. However, the rate of variance is not steady, and the correlation is loose at best. The data shown for the Femoral Shaft is the only set that clearly trends up. The other data sets only show significant differences from 10-30 packs per year.