BARON_DSC530_TermProject

March 1, 2025

Term Project Assignment:

A PowerPoint presentation outlining your statistical question/hypothesis

```
X A minimum of 5 variables in your dataset used during your analysis (for help with selecting,

X Consider what you think could have an impact on your question -
remember this is never perfect, so don’t be worried if you miss one (Chapter 1).

X Describe what the 5 variables mean in the dataset (Chapter 1).

X Include a histogram of each of the 5 variables - in your summary and analysis, identify any o

X Include the other descriptive characteristics about the variables: Mean, Mode, Spread, and Ta

X Using pg. 29 of your text as an example, compare two scenarios in your data using a PMF. Remi
it is the same variable, but a different scenario. Almost like a filter. The example in the boo

X Create 1 CDF with one of your variables, using page 41-44 as your guide, what does this tell

X Plot 1 analytical distribution and provide your analysis on how it applies to the dataset you

X Create two scatter plots comparing two variables and provide your analysis on correlation and

X Conduct a test on your hypothesis using one of the methods covered in Chapter 9.

X For this project, conduct a regression analysis on either one dependent and one explanatory v
```

Your code or screenshots of your code

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- A 250-500-word paper summarizing the following: Statistical/Hypothetical Question

- Outcome of your EDA

- What do you feel was missed during the analysis?

- Were there any variables you felt could have helped in the analysis?

- Were there any assumptions made you felt were incorrect?
- What challenges did you face, what did you not fully understand?

- Submit a link to your repository to the assignment link during the final week of class.
```

[1]:

```python
import pandas as pd
import numpy as np
import thinkstats2
import thinkplot
import warnings
import math
import matplotlib as plt
import statsmodels.formula.api as smf
warnings.filterwarnings('ignore')

def Summarize(df, column, title):
    """Print summary statistics male, female and all."""

    items = [
        ('All Yrs', df[column]),
        ('2021', df[(df.Wave == 1) | (df.Wave == 2)][column]),
        ('2022', df[(df.Wave == 3) | (df.Wave == 4)][column]),
        ('2023', df[(df.Wave == 5) | (df.Wave == 6)][column]),
        ('2024', df[(df.Wave == 7) | (df.Wave == 8)][column]),
        ]

    print(title)
    print('key\tn\tmean\tmode\tvar\tstd\tcv')
    for key, series in items:
        mean, var, mode = series.mean(), series.var(), series.mode()
        std = math.sqrt(var)
        cv = std / mean
        t = key, len(series), mean, mode, var, std, cv
        print('%s\t%d\t%4.2f\t%4.2f\t%4.2f\t%4.2f\t%4.4f' % t)

# Collect and Format Data

datain = []
datain.append(pd.read_csv("TermProjectFull.s24mri.csv.zip"))
datain.append(pd.read_csv("TermProjectFull.s23mri.csv.zip"))
datain.append(pd.read_csv("TermProjectFull.s22mri.csv.zip"))
datain.append(pd.read_csv("TermProjectFull.s21mri.csv.zip"))
first = pd.concat(datain)
labels = first.columns[7:]
dataindex = pd.DataFrame()
dataindex["Label"] = labels
columns = []
for i in range(1,126):
    columns.append("X" + str(i))
dataindex["Code"] = columns
dataindex = dataindex.set_index("Code")

data = pd.DataFrame()
data["RespID"] = first.RespID
columns = ["RespID","Health","HHI","Love","Faith","Happy","Politics"]
for i in range(1,126):
    columns.append("X" + str(i))
first.columns = columns
rest = ""
for i in range(2,126):
    rest += (" + X" + str(i))

first["HHIOctile"] = 0
octile = np.quantile(first["HHI"],[x/8 for x in range(1,8)])
first.HHIOctile[first["HHI"] < octile[0]] = 1
for x in range(0,6):
    first.HHIOctile[(first["HHI"] >= octile[x]) & (first["HHI"] < octile[x+1])] = x+2
first.HHIOctile[first["HHI"] >= octile[6]] = 8

# Use regression analysis to find the questions that are most correlated with the top-line measures of health, wealth, love, and faith.
# The top-line measures were taken from other parts of the MRI-Simmons survey so that they would not appear in this regression.

formula = "Health ~ X1 " + rest
model = smf.ols(formula, data=first)
results = model.fit()
resframe = pd.DataFrame(results.params)
final = pd.merge(resframe, dataindex, left_index=True, right_index=True, how='inner')
final.columns = ["Coef","Label"]
print("Health:\n", final.nlargest(5,"Coef"))
data["Health"] = 0
for cur in final.nlargest(5,"Coef").index.tolist()[0:5]:
    data["Health"] += first[cur]

formula = "HHIOctile ~ X1 " + rest
model = smf.ols(formula, data=first)
results = model.fit()
resframe = pd.DataFrame(results.params)
final = pd.merge(resframe, dataindex, left_index=True, right_index=True, how='inner')
final.columns = ["Coef","Label"]
print("Wealth:\n", final.nlargest(5,"Coef"))
```

```
data["Wealth"] = 0
for cur in final.nlargest(5,"Coef").index.tolist()[0:5]:
    data["Wealth"] += first[cur]

formula = "Love ~ X1 " + rest
model = smf.ols(formula, data=first)
results = model.fit()
resframe = pd.DataFrame(results.params)
final = pd.merge(resframe, dataindex, left_index=True, right_index=True,␣
 ↪how='inner')
final.columns = ["Coef","Label"]
print("Love:\n", final.nlargest(5,"Coef"))
data["Love"] = 0
for cur in final.nlargest(5,"Coef").index.tolist()[0:5]:
    data["Love"] += first[cur]

formula = "Faith ~ X1 " + rest
model = smf.ols(formula, data=first)
results = model.fit()
resframe = pd.DataFrame(results.params)
final = pd.merge(resframe, dataindex, left_index=True, right_index=True,␣
 ↪how='inner')
final.columns = ["Coef","Label"]
print("Faith:\n", final.nlargest(5,"Coef"))
data["Faith"] = 0
for cur in final.nlargest(5,"Coef").index.tolist()[0:5]:
    data["Faith"] += first[cur]
```

```
Health:
           Coef                                              Label
X101  0.080299        I make sure I take time for myself each day
X80   0.074765  Keeping a neat, organized home is a top priori…
X42   0.066211     I have a better fashion sense than most people
X82   0.053597  I feel I am more environmentally conscious tha…
X103  0.052898  I often choose methods of transportation that …
Wealth:
           Coef                                              Label
X113  0.363950  I consider my work to be a career, not just a job
X44   0.207292                 I am more capable than most people
X1    0.165013             I enjoy entertaining people in my home
X19   0.149750  My friends and acquaintances look to me to org…
X72   0.140639       I often find myself in a leadership position
Love:
           Coef                                              Label
X99   0.202690  I frequently wish I had more time to spend wit…
X84   0.091593     I often indulge my children with little extras
X94   0.082985  It's important to me that my children continue…
```

```
X107  0.079375                     I enjoy maintaining traditions
X75   0.068859            I prefer a set routine in my daily life
Faith:
          Coef                                              Label
X66  0.327826                  Prayer is a part of my daily life
X70  0.242744       Religion should be the pillar of our society
X37  0.166778  I believe in the biblical teaching that God cr…
X87  0.116645               I consider myself a spiritual person
X85  0.085618              I attend religious services regularly
```

```
[2]: data["Wave"] = [int(x)-81 for x in first["RespID"].str[:2]]
     data["Happy"] = first["Happy"]
     data["Strength"] = data.Health + data.Wealth + data.Love + data.Faith

     # Note: Political Outloook in the study is measured on a five point scale. ␣
      ↪I've randomly assigned 50% of "Middle of the Road" people
     # to each of the polar groups.

     nMOR = len(first[first.Politics == 3])
     data["rand"] = np.random.rand(len(data))
     data["Politics"] = first.Politics
     data["Politics"][(data.Politics == 3) & (data.rand < 0.5)] = 4
     data["Politics"][data.Politics == 3] = 2
     data = data.drop(columns = ["rand"])

     print(data.head(10))
```

```
            RespID  Health  Wealth  Love  Faith  Wave  Happy  Strength  \
0  89001W8912BZDMB      15      15    15     15     8      3        60
1  89001W8912FJZA1      13      17    15     16     8      4        61
2  89001W8912NWF3E      12       9    11      6     8      3        38
3  89001W8913R7HJS      12      10    13     14     8      3        49
4  89001W8913TWRA6      16      14    14     12     8      2        56
5  89001W8913VMQM9      14       9    13      5     8      3        41
6  89001W8913YV4PR      13       6    14     15     8      3        48
7  89001W8919HSVDN      11      10     8      5     8      3        34
8  89001W891AAM1G5      15      15     9     10     8      4        49
9  89001W891ABWDW1      16      15    16     16     8      4        63

   Politics
0         2
1         1
2         1
3         4
4         2
5         2
6         5
7         2
```

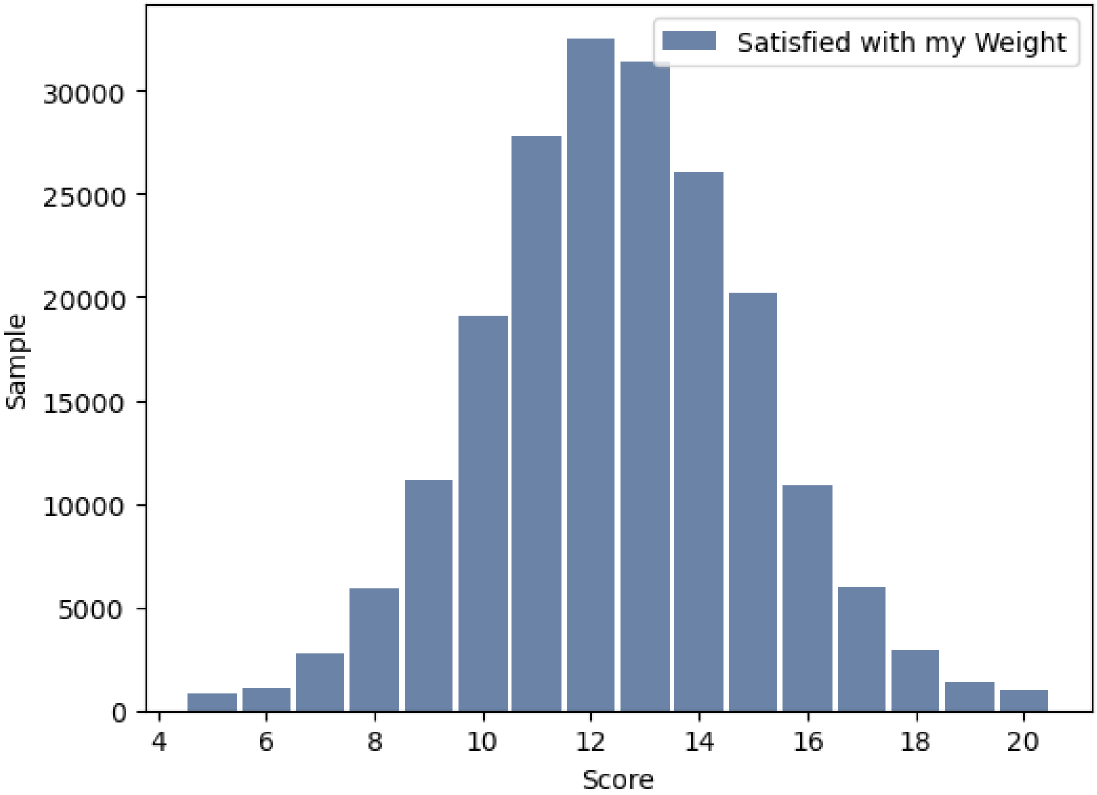
```
8          4
9          2
```

Include a histogram of each of the 5 variables – in your summary and analysis, identify any outliers and explain the reasoning for them being outliers and how you believe they should be handled (Chapter 2).

[3]:

```
# Histograms of Health

Summarize(data,"Health","Satisfied with my Weight:")
print("Skew: ", data["Health"].skew())
hist = thinkstats2.Hist(data.Health, label='Satisfied with my Weight')
thinkplot.Hist(hist)
thinkplot.Show(xlabel='Score', ylabel='Sample')
```

```
Satisfied with my Weight:
key     n       mean    mode    var     std     cv
All Yrs 201216  12.52   12.00   6.32    2.51    0.2009
2021    23964   12.59   13.00   4.88    2.21    0.1754
2022    48668   12.50   12.00   6.25    2.50    0.2000
2023    51409   12.55   12.00   6.54    2.56    0.2038
2024    51480   12.47   12.00   6.68    2.58    0.2072
Skew:  0.04511917961442357
```

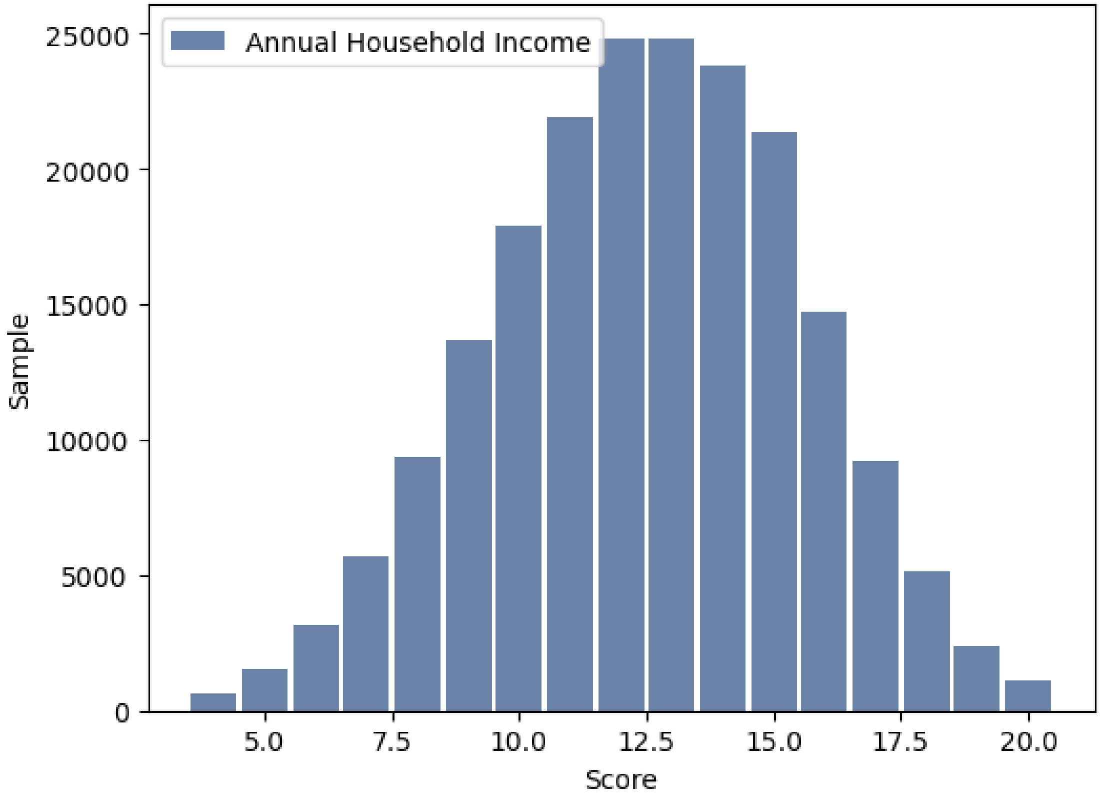


```
<Figure size 800x600 with 0 Axes>
```

[4]:

```
# Histograms of Wealth

Summarize(data,"Wealth","Annual Household Income:")
print("Skew: ", data["Wealth"].skew())
hist = thinkstats2.Hist(data.Wealth, label='Annual Household Income')
thinkplot.Hist(hist)
thinkplot.Show(xlabel='Score', ylabel='Sample')
```

```
Annual Household Income:
key     n       mean    mode    var     std     cv
All Yrs 201216  12.49   13.00   9.13    3.02    0.2419
2021    23964   12.71   12.00   7.68    2.77    0.2181
2022    48668   12.57   12.00   9.06    3.01    0.2395
2023    51409   12.46   12.00   9.36    3.06    0.2456
2024    51480   12.38   13.00   9.32    3.05    0.2466
Skew:  -0.12802835943871577
```

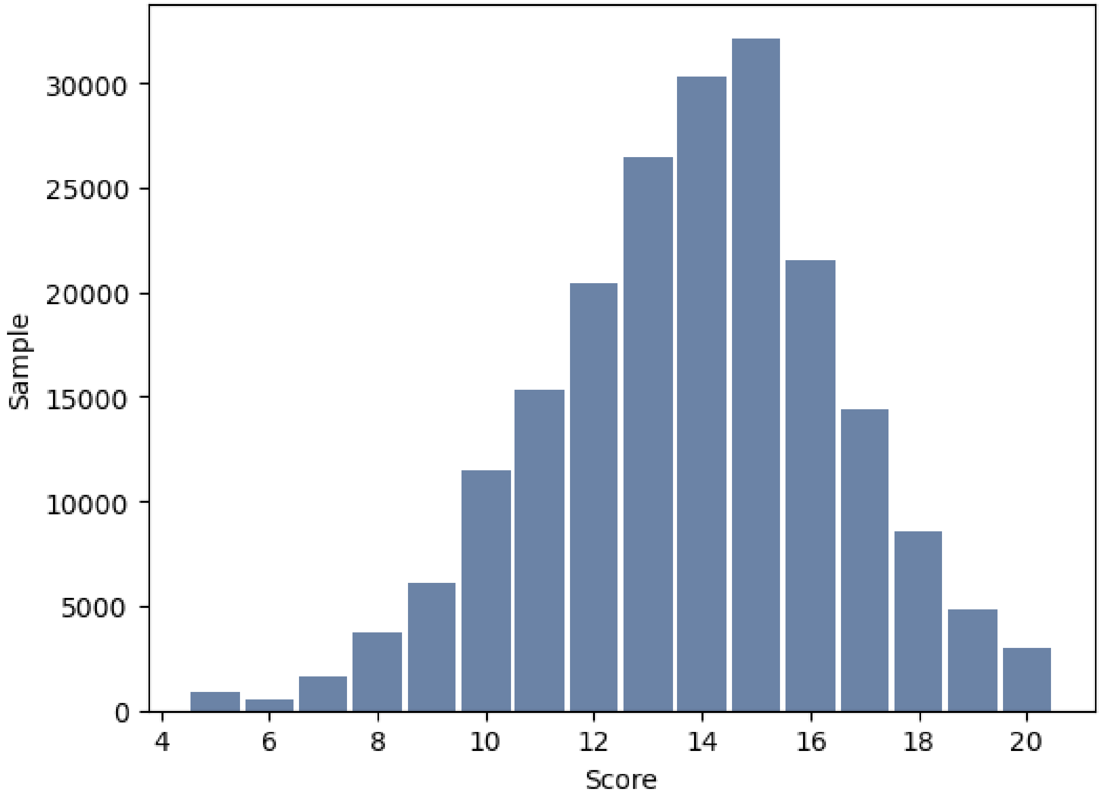


```
<Figure size 800x600 with 0 Axes>
```

[18]:

```
# Histograms of Love

Summarize(data,"Love","Spending time with my family is my top priority")
print("Skew: ", data["Love"].skew())
hist = thinkstats2.Hist(data.Love, label='Spending time with my family is my␣
 ↪top priority')
thinkplot.Hist(hist)
thinkplot.Show(xlabel='Score', ylabel='Sample')
```

```
Spending time with my family is my top priority
key      n        mean     mode     var      std      cv
All Yrs 201216   13.79    15.00    7.49     2.74     0.1984
2021     23964    13.85    15.00    6.53     2.56     0.1845
2022     48668    13.80    15.00    7.34     2.71     0.1962
2023     51409    13.77    15.00    7.74     2.78     0.2020
2024     51480    13.79    15.00    7.63     2.76     0.2004
Skew:  -0.2626352669821632
```



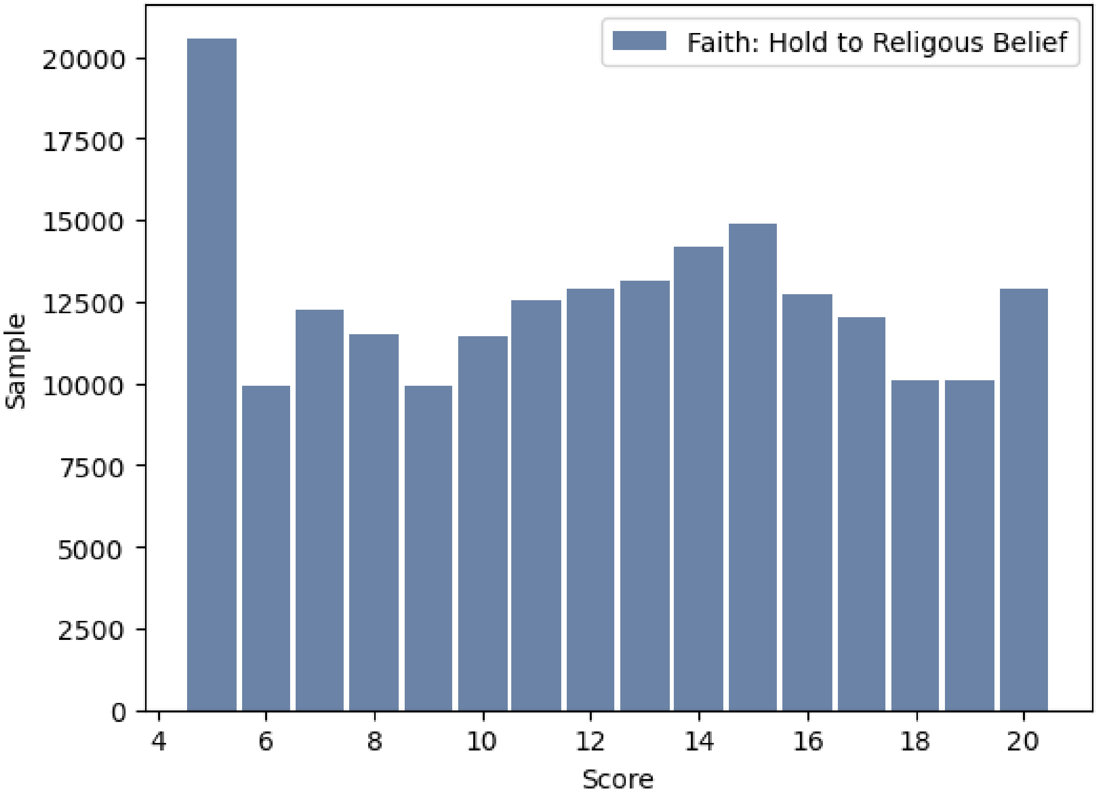
```
<Figure size 800x600 with 0 Axes>
```

[6]:

```
# Histograms of Health
```

```
Summarize(data,"Faith","Faith: Hold to Religious Belief")
print("Skew: ", data["Faith"].skew())
hist = thinkstats2.Hist(data.Faith, label='Faith: Hold to Religous Belief')
thinkplot.Hist(hist)
thinkplot.Show(xlabel='Score', ylabel='Sample')
```

```
Faith: Hold to Religious Belief
key     n       mean    mode    var     std     cv
All Yrs 201216  12.28   5.00    21.78   4.67    0.3801
2021    23964   12.16   8.00    17.97   4.24    0.3485
2022    48668   12.25   5.00    22.78   4.77    0.3896
2023    51409   12.24   5.00    22.33   4.73    0.3862
2024    51480   12.33   5.00    22.00   4.69    0.3806
Skew:  -0.018722285445544493
```

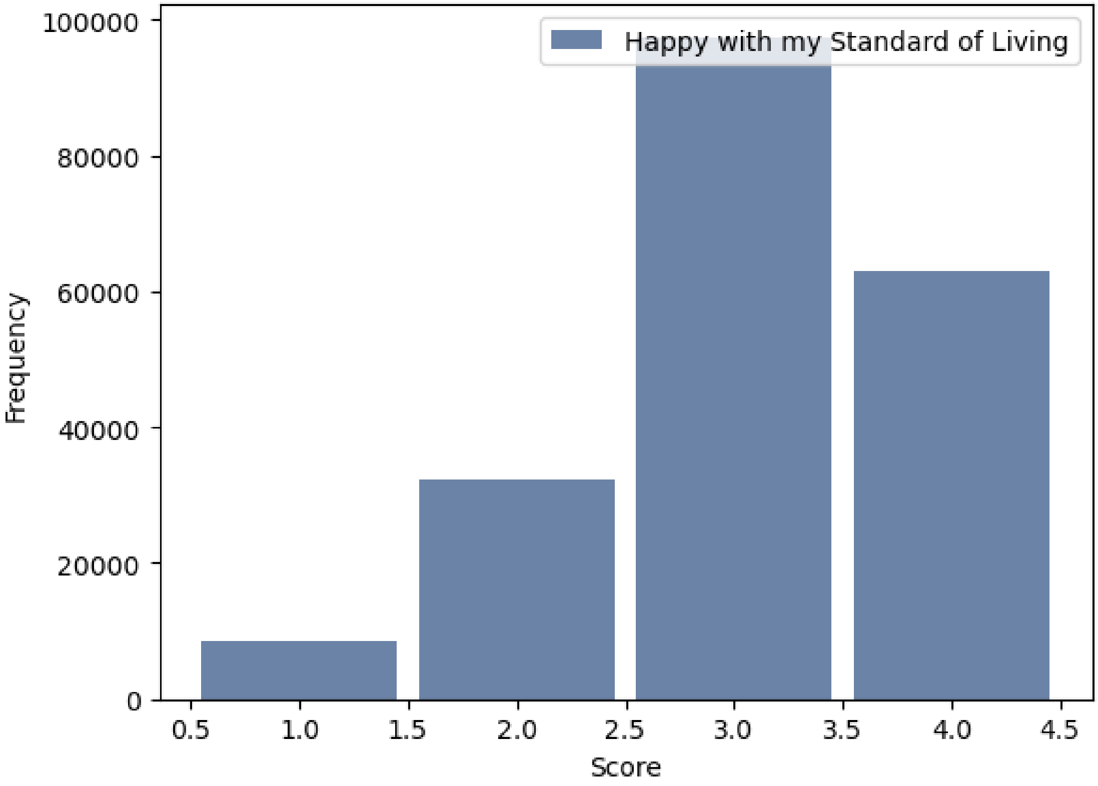


```
<Figure size 800x600 with 0 Axes>
```

[7]:

```
# Histograms of Happiness

Summarize(data,"Happy","Happy with my Standard of Living:")
hist = thinkstats2.Hist(data.Happy, label='Happy with my Standard of Living')
thinkplot.Hist(hist)
thinkplot.Show(xlabel='Score', ylabel='Frequency')
print("Skew: ", data["Happy"].skew())
```

```
Happy with my Standard of Living:
key     n       mean    mode    var     std     cv
All Yrs 201216  3.07    3.00    0.64    0.80    0.2609
2021    23964   3.13    3.00    0.56    0.75    0.2392
2022    48668   3.12    3.00    0.60    0.77    0.2478
2023    51409   3.06    3.00    0.66    0.81    0.2660
2024    51480   3.03    3.00    0.67    0.82    0.2704
```



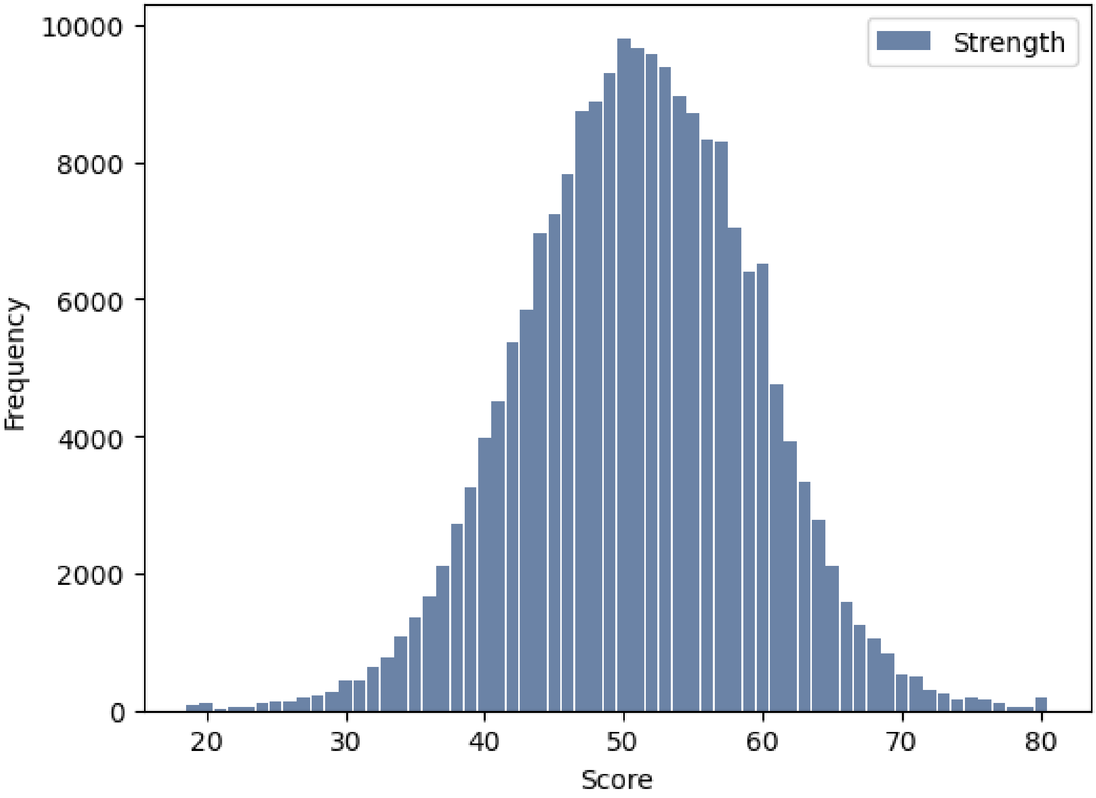
```
Skew:  -0.6242185413458968

<Figure size 800x600 with 0 Axes>
```

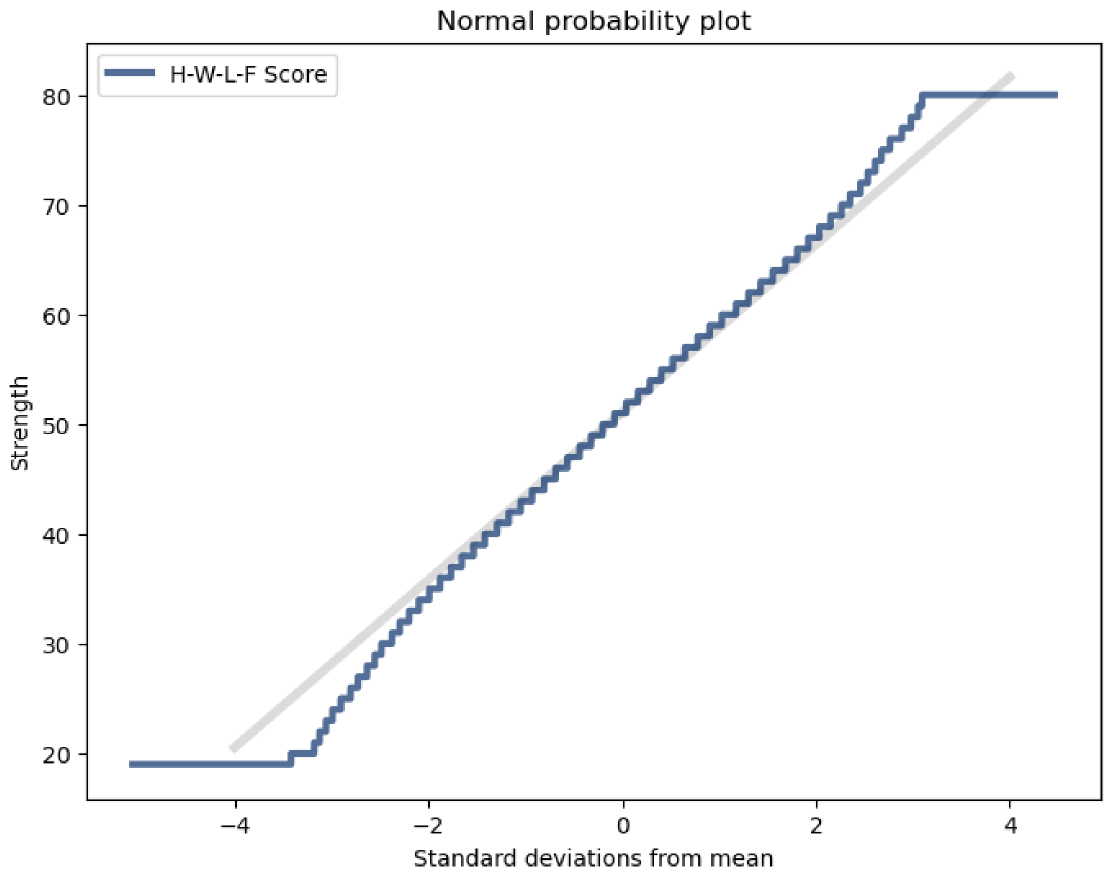
Plot 1 analytical distribution and provide your analysis on how it applies to the dataset you have chosen (Chapter 5).

[8]:
```
# Plot a histogram and analytical distribtion of the combined "Strength" score
# Note: I did these out of book order here and in the presentation for the␣
 ↪purpose of introducing the strength score
# which is used in the next few slides.
```

```
Summarize(data,"Strength","Health+Wealth+Love+Faith Score:")
print("Skew:", data.Strength.skew())
print("Kurtosis:", data.Strength.kurtosis())
hist = thinkstats2.Hist(data.Strength, label='Strength')
thinkplot.Hist(hist)
thinkplot.Show(xlabel='Score', ylabel='Frequency')

mean, var = thinkstats2.TrimmedMeanVar(data.Strength, p=0.01)
std = np.sqrt(var)

xs = [-4, 4]
fxs, fys = thinkstats2.FitLine(xs, mean, std)
thinkplot.Plot(fxs, fys, linewidth=4, color="0.8")

xs, ys = thinkstats2.NormalProbability(data.Strength)
thinkplot.Plot(xs, ys, label="H-W-L-F Score")

thinkplot.Config(
    title="Normal probability plot",
    xlabel="Standard deviations from mean",
    ylabel="Strength",
)
```

```
Health+Wealth+Love+Faith Score:
key     n       mean    mode    var     std     cv
All Yrs 201216  51.08   50.00   68.18   8.26    0.1616
2021    23964   51.31   51.00   49.78   7.06    0.1375
2022    48668   51.13   51.00   68.10   8.25    0.1614
2023    51409   51.01   51.00   71.41   8.45    0.1657
2024    51480   50.96   50.00   70.99   8.43    0.1653
Skew: -0.06853466110133538
Kurtosis: 0.2463600818625875
```

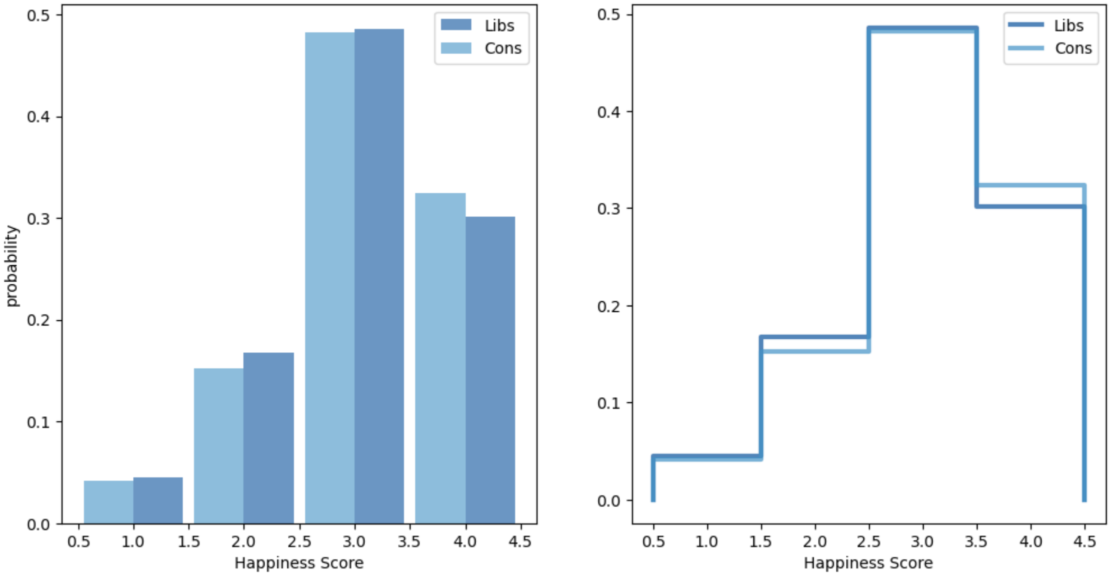

Strength
Frequency
10000
8000
6000
4000
2000
0
20
30
40
50
60
70
80
Score

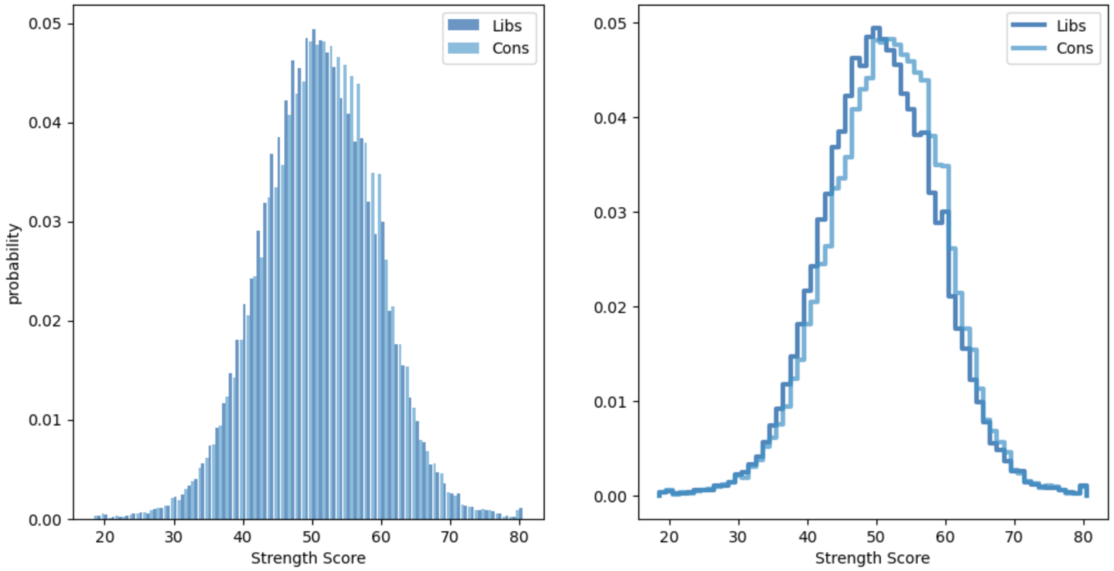


0.0.1 Using pg. 29 of your text as an example, compare two scenarios in your data using a PMF. Reminder, this isn't comparing two variables against each other – it is the same variable, but a different scenario. Almost like a filter. The example in the book is first babies compared to all other babies, it is still the same variable, but breaking the data out based on criteria we are exploring (Chapter 3).

[9]:

```
# Compare Conservatives and Liberals in terms of Strength and Happiness

# Low Politics is Conservative, High Politics is Liberal
Liberal_Happy = thinkstats2.Pmf(data[data.Politics > 3].Happy, label="Libs")
Conserv_Happy = thinkstats2.Pmf(data[data.Politics < 3].Happy, label="Cons")
Liberal_Stren = thinkstats2.Pmf(data[data.Politics > 3].Strength, label="Libs")
Conserv_Stren = thinkstats2.Pmf(data[data.Politics < 3].Strength, label="Cons")

width = 0.45
thinkplot.PrePlot(2, cols=2)
thinkplot.Hist(Liberal_Happy, align='left', width=width, label = "Libs")
thinkplot.Hist(Conserv_Happy, align='right', width=width, label = "Cons")
thinkplot.Config(xlabel='Happiness Score', ylabel='probability')
thinkplot.PrePlot(2)
thinkplot.SubPlot(2)
thinkplot.Pmfs([Liberal_Happy, Conserv_Happy])
thinkplot.Show(xlabel='Happiness Score')

thinkplot.PrePlot(2, cols=2)
thinkplot.Hist(Liberal_Stren, align='left', width=width, label = "Libs")
thinkplot.Hist(Conserv_Stren, align='right', width=width, label = "Cons")
thinkplot.Config(xlabel='Strength Score', ylabel='probability')
thinkplot.PrePlot(2)
thinkplot.SubPlot(2)
thinkplot.Pmfs([Liberal_Stren, Conserv_Stren])
thinkplot.Show(xlabel='Strength Score')
```



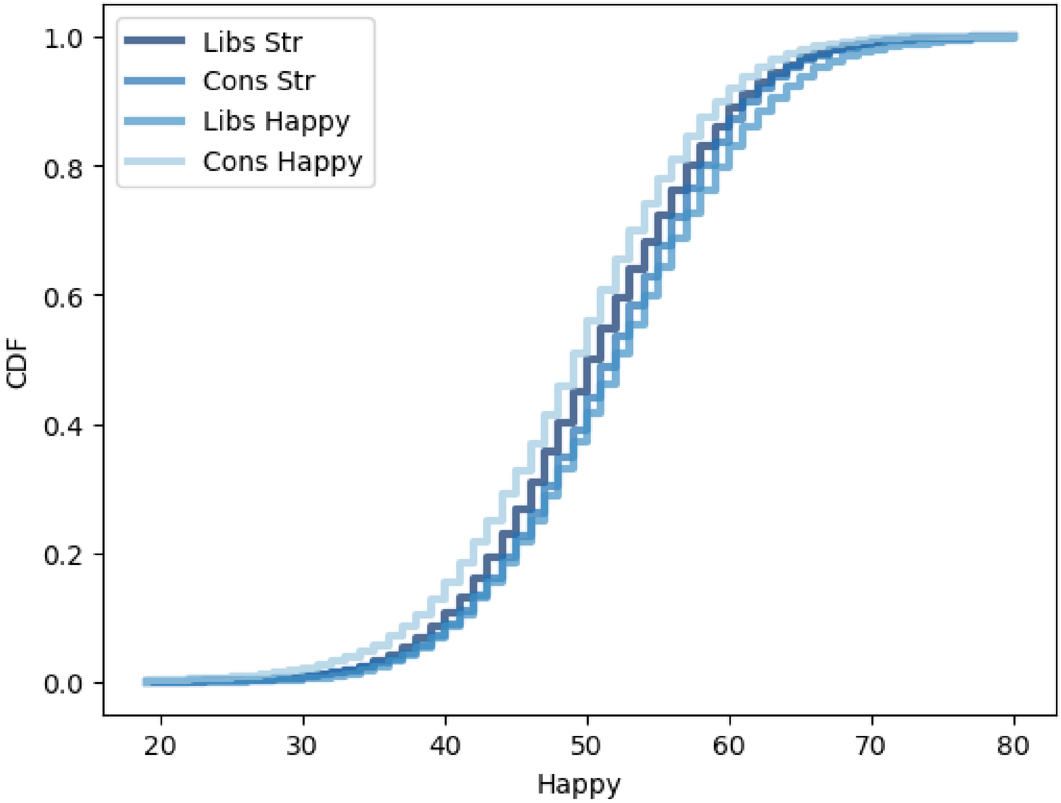


```
<Figure size 800x600 with 0 Axes>
```

0.0.2 Create 1 CDF with one of your variables, using page 41-44 as your guide, what does this tell you about your variable and how does it address the question you are trying to answer (Chapter 4).

[10]:

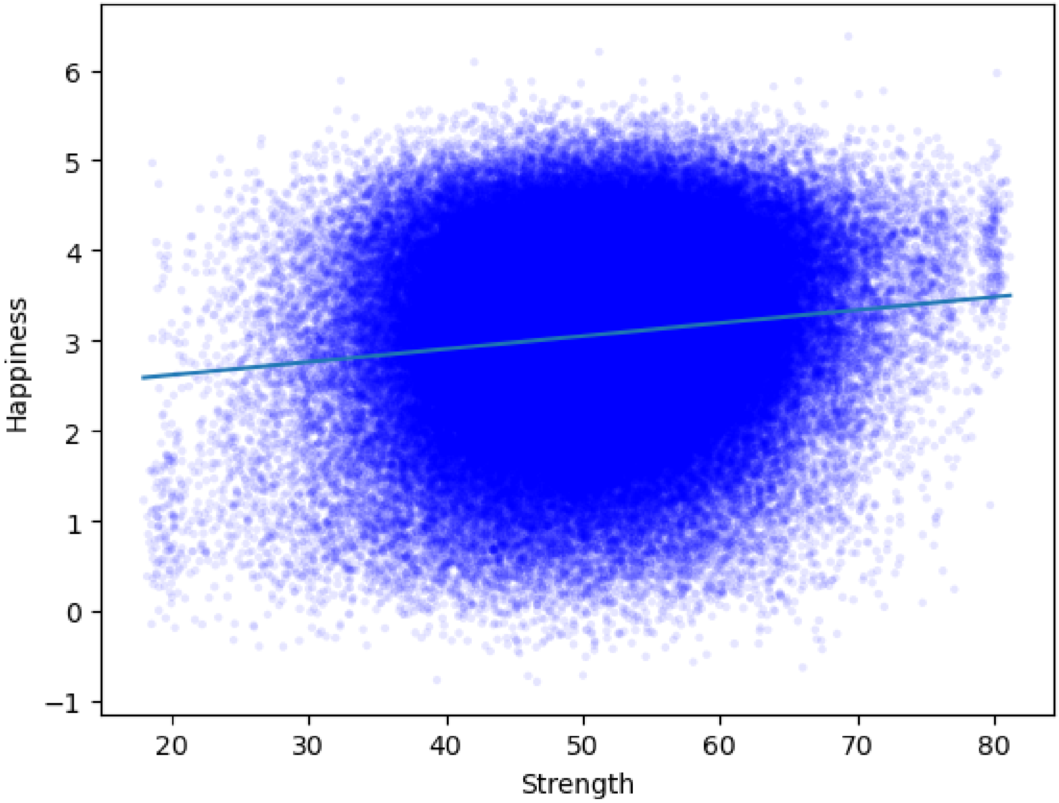
```
# Compare Conservatives and Liberals in terms of Strength and Happiness using a␣
 ↪CDF chart

Liberal_cdf = thinkstats2.Cdf(data[data.Politics > 3 ].Strength, label="Libs␣
 ↪Str")
Conserv_cdf = thinkstats2.Cdf(data[data.Politics < 3 ].Strength, label="Cons␣
 ↪Str")
thinkplot.Cdfs([Liberal_cdf, Conserv_cdf])
thinkplot.Config(xlabel='Strength', ylabel='CDF')
Liberal_cdf = thinkstats2.Cdf(data[data.Happy > 3 ].Strength, label="Libs␣
 ↪Happy")
Conserv_cdf = thinkstats2.Cdf(data[data.Happy < 3 ].Strength, label="Cons␣
 ↪Happy")
thinkplot.Cdfs([Liberal_cdf, Conserv_cdf])
thinkplot.Config(xlabel='Happy', ylabel='CDF')
```



Create two scatter plots comparing two variables and provide your analysis on correlation and causation. Remember, covariance, Pearson's correlation, and Non-Linear Relationships should also be considered during your analysis (Chapter 7).

[11]:
```
# Create a point cloud and correlation line of strenth scores vs. happiness␣
↪scores.

from numpy.polynomial.polynomial import polyfit
import matplotlib.pyplot as plt

def Jitter(values, jitter=0.5):
    n = len(values)
    return np.random.normal(0, jitter, n) + values

def Cov(xs, ys, meanx=None, meany=None):
    xs = np.asarray(xs)
    ys = np.asarray(ys)
    if meanx is None:
        meanx = np.mean(xs)
    if meany is None:
        meany = np.mean(ys)
    cov = np.dot(xs-meanx, ys-meany) / len(xs)
    return cov

def Corr(xs, ys):
    xs = np.asarray(xs)
    ys = np.asarray(ys)
    meanx, varx = thinkstats2.MeanVar(xs)
    meany, vary = thinkstats2.MeanVar(ys)
    corr = Cov(xs, ys, meanx, meany) / np.sqrt(varx * vary)
    return corr

def SpearmanCorr(xs, ys):
    xranks = pd.Series(xs).rank()
    yranks = pd.Series(ys).rank()
    return Corr(xranks, yranks)

print(f"Correlation: {Corr(data.Strength,data.Happy):.4f}\nSpearmans Corr:␣
  ↪{SpearmanCorr(data.Strength,data.Happy):.4f}")
xs = [-4, 4]
jstrength, jhappy = Jitter(data.Strength), Jitter(data.Happy)
bins = np.arange(0, 20, 1)
indices = np.digitize(jstrength, bins)
groups = data.groupby(indices)
mean_strengths = [jstrength.mean() for i, group in groups]
cdfs = [thinkstats2.Cdf(jhappy) for i, group in groups]
for percent in [75, 50, 25]:
    weight_percentiles = [cdf.Percentile(percent) for cdf in cdfs]
    label = '%dth' % percent
    thinkplot.Plot(mean_strengths, weight_percentiles, label=label)

thinkplot.Scatter(jstrength, jhappy, alpha=0.1, s=10)
plt.plot(np.unique(jstrength), np.poly1d(np.polyfit(jstrength, jhappy, 1))(np.
  ↪unique(jstrength)))
thinkplot.Config(xlabel='Strength',
                 ylabel='Happiness',
                 legend=False)
```

```
Correlation: 0.1505
Spearmans Corr: 0.1282
```

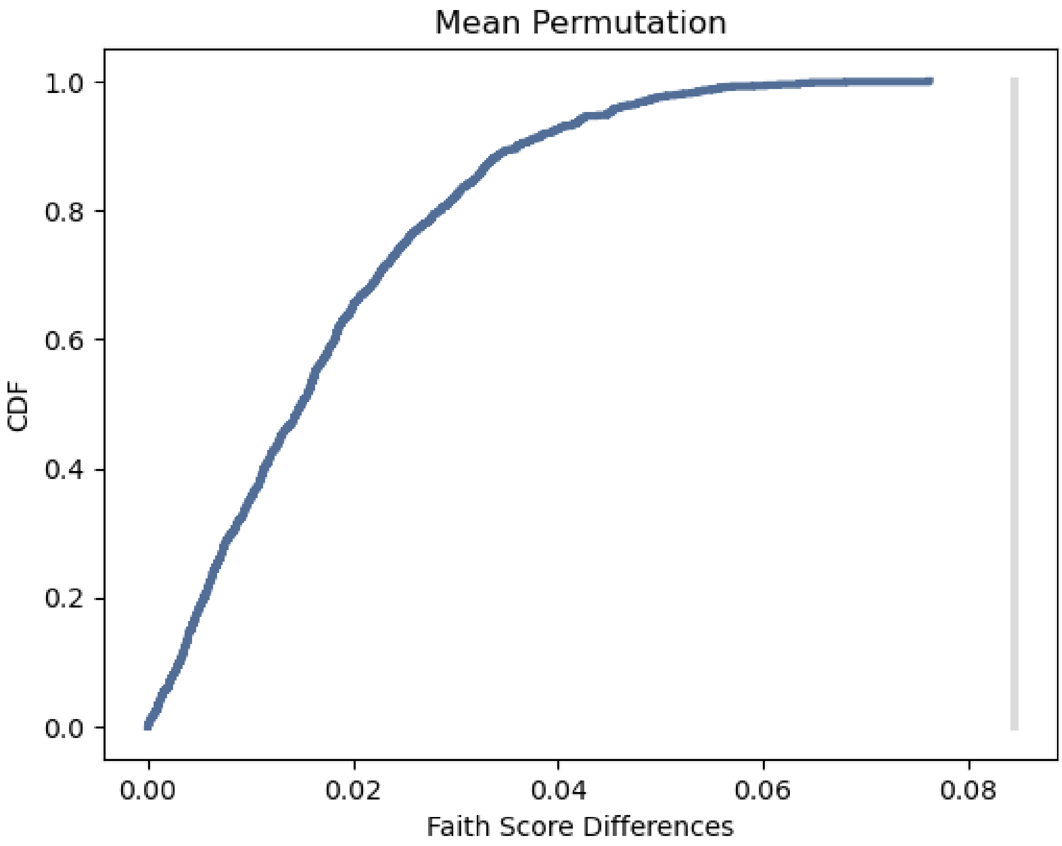


Conduct a test on your hypothesis using one of the methods covered in Chapter 9.

[12]:
```
# Take a closer look at that Faith measure, which appears to show a drop over the last four years.

class DiffMeansPermute(thinkstats2.HypothesisTest):

    def TestStatistic(self, data):
        group1, group2 = data
        test_stat = abs(group1.mean() - group2.mean())
        return test_stat

    def MakeModel(self):
        group1, group2 = self.data
        self.n, self.m = len(group1), len(group2)
        self.pool = np.hstack((group1, group2))

    def RunModel(self):
        np.random.shuffle(self.pool)
        data = self.pool[:self.n], self.pool[self.n:]
        return data
```

```
Later = data.Faith[data.Wave >=5]
Early = data.Faith[data.Wave < 5]
hdata = Early, Later
ht = DiffMeansPermute(hdata)
pvalue = ht.PValue()

print(pvalue)
ht.PlotCdf()
thinkplot.Show(title="Mean Permutation", xlabel='Faith Score Differences',␣
 ↪ylabel='CDF')
```

```
0.0
```



```
<Figure size 800x600 with 0 Axes>
```

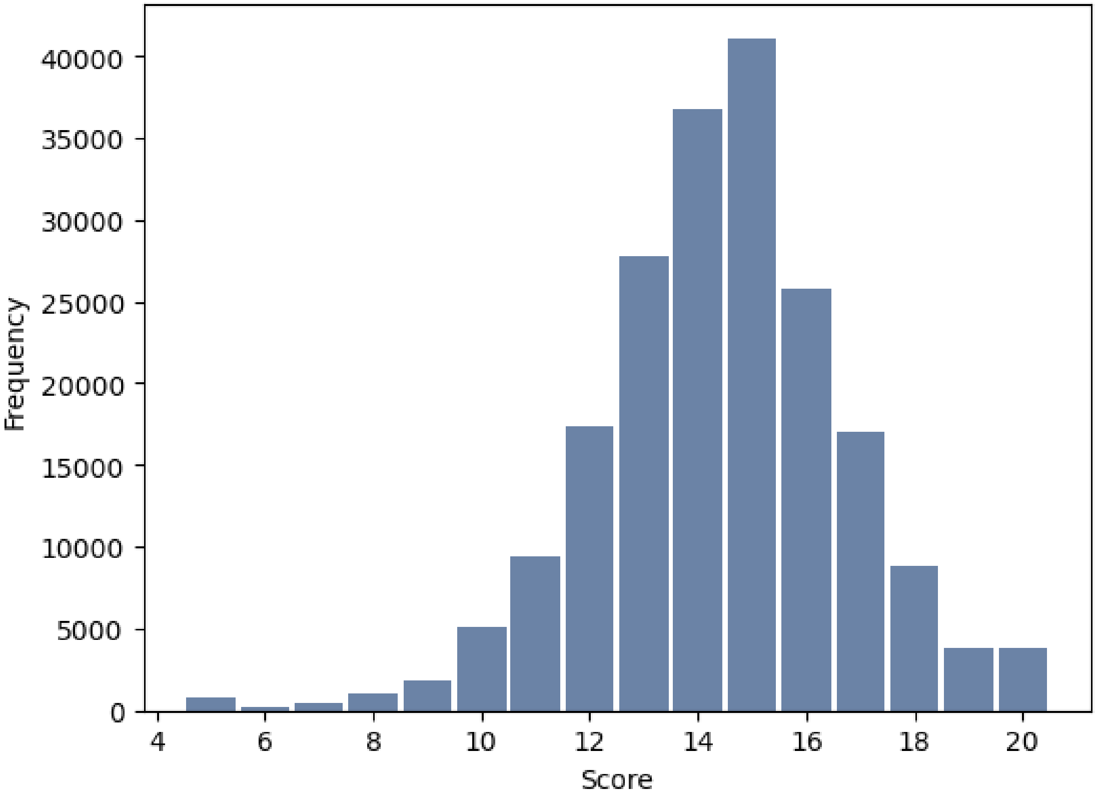
For this project, conduct a regression analysis on either one dependent and one explanatory variable, or multiple explanatory variables (Chapter 10 & 11).

[17]:

```
# Preform a regression analysis on each of the components of strength to happiness, then use regression to get the individual
# questions that are most correlated with happiness.  Finally, show the histogram of happiness in terms of the top five questions.

formula = 'Happy ~ Health + Wealth + Love + Faith'
model = smf.ols(formula, data=data)
results = model.fit()
resframe = pd.DataFrame(results.params)
resframe.columns = ["Coef"]
print(resframe)
print(results.summary())

allq = pd.DataFrame(first["X1"])
allq["Happy"] = first.Happy
formula = 'Happy ~ X1'
for i in range(2,126):
    allq["X"+str(i)] = first["X"+str(i)]
    formula += (" + X" + str(i))

model = smf.ols(formula, data=allq)
results = model.fit()
resframe = pd.DataFrame(results.params)
final = pd.merge(resframe, dataindex, left_index=True, right_index=True, how='inner')
final.columns = ["Coef","Label"]
print(final.nlargest(5,"Coef"))
# print(results.summary())

data["HappyC"] = 0
lst = final.nlargest(5,"Coef").index.tolist()
print(lst[0:5])
for cur in lst[0:5]:
    data["HappyC"] += first[cur]
Summarize(data,"HappyC","Happy Attitude Score")
print("Skew:",data["HappyC"].skew())
print("Kurtosis:",data["HappyC"].kurtosis())
hist = thinkstats2.Hist(data.HappyC, label='Happiness')
thinkplot.Hist(hist)
thinkplot.Show(xlabel='Score', ylabel='Frequency')
```

```
                Coef
Intercept   2.307176
Health      0.011130
Wealth      0.033594
```

```
Love       0.003166
Faith      0.012808
                            OLS Regression Results
==============================================================================
Dep. Variable:                  Happy   R-squared:                       0.028
Model:                            OLS   Adj. R-squared:                  0.028
Method:                 Least Squares   F-statistic:                     1462.
Date:                Sat, 01 Mar 2025   Prob (F-statistic):               0.00
Time:                        10:22:50   Log-Likelihood:            -2.3776e+05
No. Observations:              201216   AIC:                         4.755e+05
Df Residuals:                  201211   BIC:                         4.756e+05
Df Model:                           4
Covariance Type:            nonrobust
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
Intercept      2.3072      0.012    190.054      0.000       2.283       2.331
Health         0.0111      0.001     15.062      0.000       0.010       0.013
Wealth         0.0336      0.001     54.539      0.000       0.032       0.035
Love           0.0032      0.001      4.434      0.000       0.002       0.005
Faith          0.0128      0.000     31.794      0.000       0.012       0.014
==============================================================================
Omnibus:                     9310.237   Durbin-Watson:                   1.986
Prob(Omnibus):                  0.000   Jarque-Bera (JB):            10668.794
Skew:                          -0.564   Prob(JB):                         0.00
Kurtosis:                       2.953   Cond. No.                         179.
==============================================================================

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly
specified.
        Coef                                              Label
X3  0.222244  It is important to continue learning new thing…
X4  0.148704        I often do things on the spur of the moment
X6  0.104581  On the whole, people get what they deserve in …
X9  0.090982                                   I am an optimist
X1  0.082823             I enjoy entertaining people in my home
['X3', 'X4', 'X6', 'X9', 'X1']
Happy Attitude Score
key     n       mean    mode    var     std     cv
All Yrs 201216  14.41   15.00   5.42    2.33    0.1616
2021    23964   14.49   15.00   4.83    2.20    0.1517
2022    48668   14.48   15.00   5.04    2.25    0.1551
2023    51409   14.38   15.00   5.57    2.36    0.1642
2024    51480   14.36   15.00   5.67    2.38    0.1659
Skew: -0.33384306226253624
Kurtosis: 1.0775406282881836
```


Frequency
40000
35000
30000
25000
20000
15000
10000
5000
0
4
6
8
10
12
14
16
18
20
Score

```
<Figure size 800x600 with 0 Axes>
```

```
[ ]:
```