Python for Math and Stat

Write your name below. This exam has 4 questions and is worth 50 points. You are not allowed to collaborate on the exam or seek outside help, nor can you use a calculator, any computational software, or material you find online. You may assume that all necessary packages have been imported in each problem.

Name:

1. (20 pts) For the following 4 problems, write down what each code block would display if executed in a Jupyter cell. If the code generates an error or an infinite loop, write Error.

   (a)
   ```
   z = '2'
   x = 1
   while x < 12:
       z += str(x)
       x += 2
   z
   ```

   Solution: '21357911'

   (b)
   ```
   word = 'Symmetries'
   print(word.split('e'))
   ```

   Solution: ['Symm','tri','s']

   (c)
   ```
   m, n = 9, 4
   f'm/n = {m/n:5.3f}'
   ```

   Solution: 'm/n = 2.250'

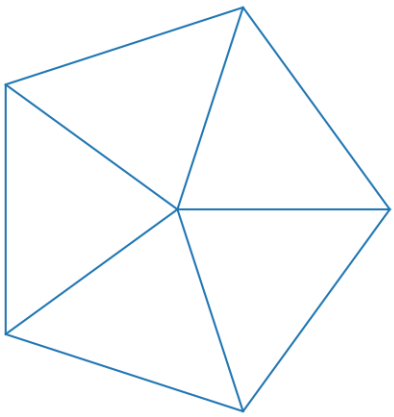
   (d)
   ```
   def func(n):
       print(n, end=' ')
       if n % 4 == 0:
           return n
       else:
           return func(n-1)

   func(6)
   ```

   Solution:
   6 5 4
   4

2. (10 pts) Write a function called seg_polygon(n) which draws a regular polygon with n sides divided into segments by lines going from the origin to the corners. Any orientation of the polygon is acceptable.

   Calling seg_polygon(5) in a Jupyter cell would produce a graphic similar to this:



Solution:

```
def seg_polygon(num):
    plt.figure(figsize=(6,6))
    plt.axis('equal')
    plt.axis('off')
    t = np.linspace(0,2*np.pi,num+1)
    xvals = np.cos(t)
    yvals = np.sin(t)
    plt.plot(xvals,yvals)
    for i in range(num):
        plt.plot([0,xvals[i]],[0,yvals[i]],'C0')
```

3. (10 pts) Professor Rincewind's School of Majick has very specific requirements for the passwords on its computer systems. Passwords must contain a number and both lower and upper case letters, but it must not contain the number 8 or the word eight. Write a function called check_pw(word) which returns True if the input is a valid password and False otherwise. For example check_pw('Thx-1138') would return False.

   Solution:

```
def check_pw(word):
    check = True
    if '8' in word:
        check = False
    if 'eight' in word:
        check = False
    lower = False
    upper = False
    number = False
    for ch in word:
        if ch.islower():
            lower = True
        if ch.isupper():
            upper = True
        if ch.isnumeric():
            number = True
    if not (lower and upper and number):
        check = False
    return check
```

4. (10 pts) The local coffee shop uses a python dictionary to keep track of it's prices. The dictionary keys are the item names while the values are the prices in cents. Write a function called discount_price(dictionary, item_list, percent) which takes the dictionary and a list of item names and decreases all of the list items prices by the same percent. Make sure to round fractions to the nearest cent.

   For example, if the Grande Latte costs \$6.00 and the Venti Latte costs \$8.50 then calling `discount_price(Prices, ['Grande Latte', 'Venti Latte'] ,20)` would change the prices of these items in the Prices dictionary to \$4.80 and \$6.80.

   Solution:

```
def discount_price(dictionary, item_list, percent):
    for item in item_list:
        dictionary[item] = round(dictionary[item]*(1-percent/100),2)
```