

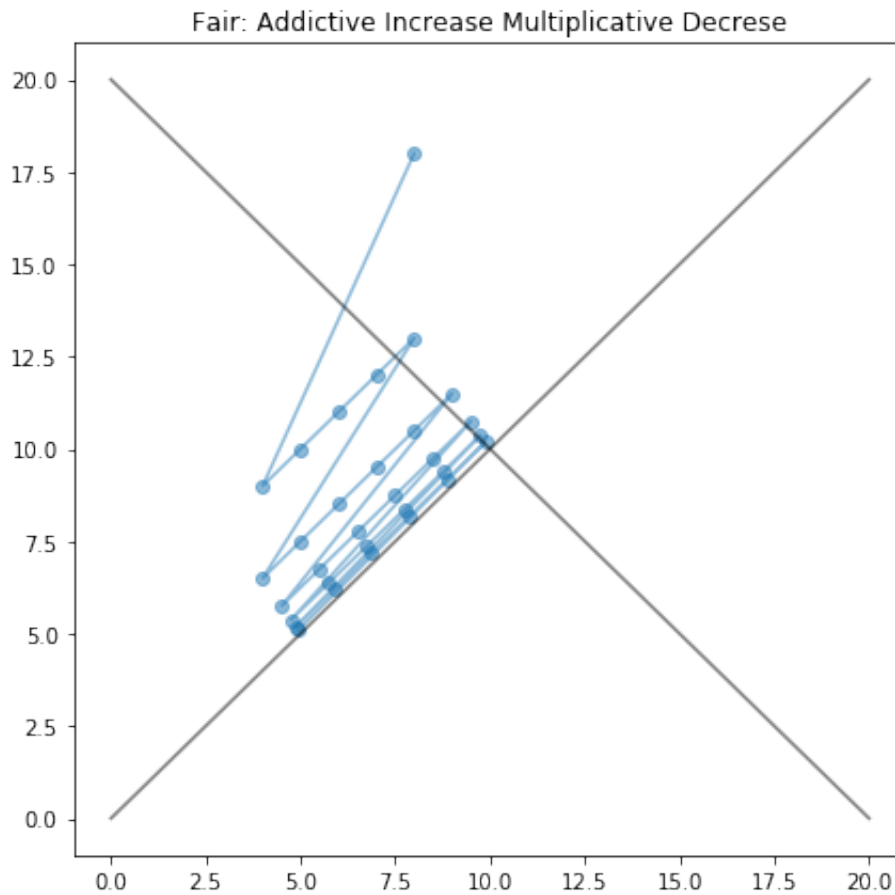
```
In [120]: import matplotlib.pyplot as plt
import numpy as np
```

```
In [121]: def aimd(x, y):
    '''Addictive Increase Multiplicative Decrease

    This is the real case and the fair case
    '''
    total = x + y
    points = [[x, y]]
    for i in range(0, 30):
        size = len(points)
        point = points[size-1]
        x = point[0]
        y = point[1]
        if x + y < 20: # increase
            x += 1
            y += 1
        else:          # decrease
            x /= 2
            y /= 2
        points.append([x, y])
    return points
```

```
In [122]: array = np.transpose(aimd(8, 18))

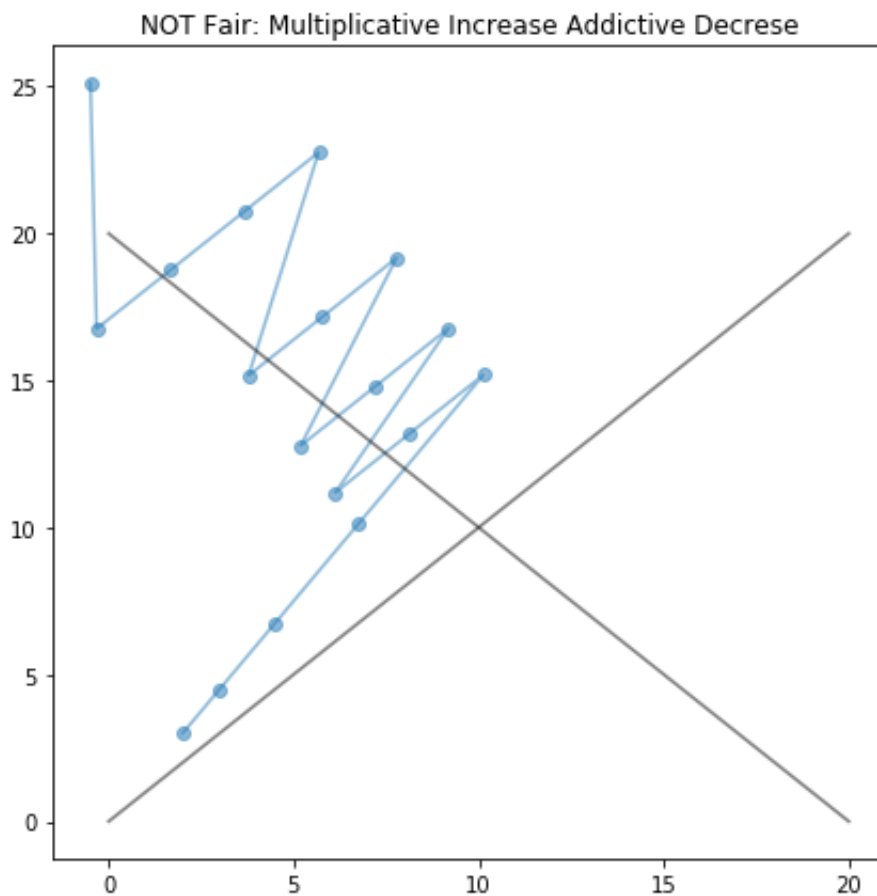
plt.figure(figsize=(7,7))
plt.plot(array[0], array[1], alpha=0.5, marker = 'o')
x1, y1 = [0, 20], [0, 20]
x2, y2 = [0, 20], [20, 0]
plt.plot(x1, y1, x2, y2, alpha=0.5, color='0')
plt.title('Fair: Addictive Increase Multiplicative Decrease')
plt.show()
```



Fair: Addictive Increase Multiplicative Decrease

```
In [123]: def miad(x, y):  
    '''Multiplicative Increase Addictive Decrease  
    '''  
    total = x + y  
    points = [[x, y]]  
    for i in range(0, 17):  
        size = len(points)  
        point = points[size-1]  
        x = point[0]  
        y = point[1]  
        if x + y < 20: # increase  
            x *= 1.5  
            y *= 1.5  
        else: # decrease  
            x -= 2  
            y -= 2  
        points.append([x, y])  
    return points
```

```
In [124]: array = np.transpose(miad(2, 3))  
  
plt.figure(figsize=(7,7))  
plt.plot(array[0], array[1], alpha=0.5, marker = 'o')  
x1, y1 = [0, 20], [0, 20]  
x2, y2 = [0, 20], [20, 0]  
plt.plot(x1, y1, x2, y2, alpha=0.5, color='0')  
plt.title('NOT Fair: Multiplicative Increase Addictive Decrease')  
plt.show()
```

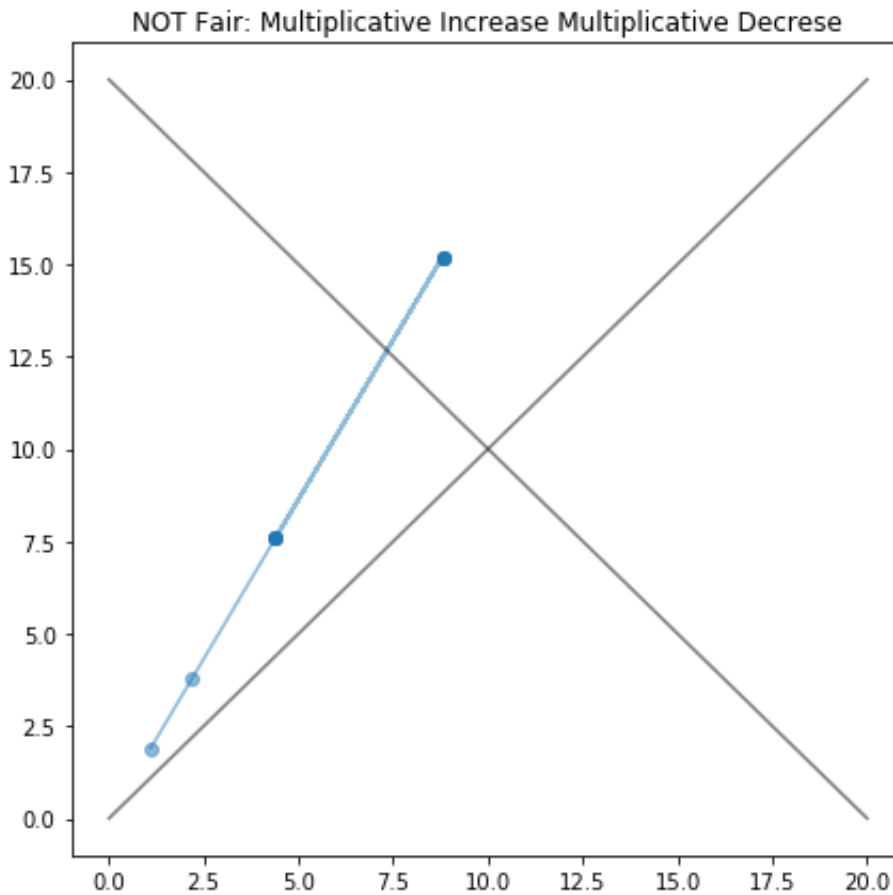


Not fair: Multiplicative Increase Addictive Decrease

```
In [125]: def mimd(x, y):
            '''Multiplicative Increase Multiplicative Decrease
            '''
            total = x + y
            points = [[x, y]]
            for i in range(0, 10):
                size = len(points)
                point = points[size-1]
                x = point[0]
                y = point[1]
                if x + y < 20: # increase
                    x *= 2
                    y *= 2
                else:          # decrease
                    x /= 2
                    y /= 2
                points.append([x, y])
            return points
```

```
In [126]: array = np.transpose(mimd(1.1, 1.9))

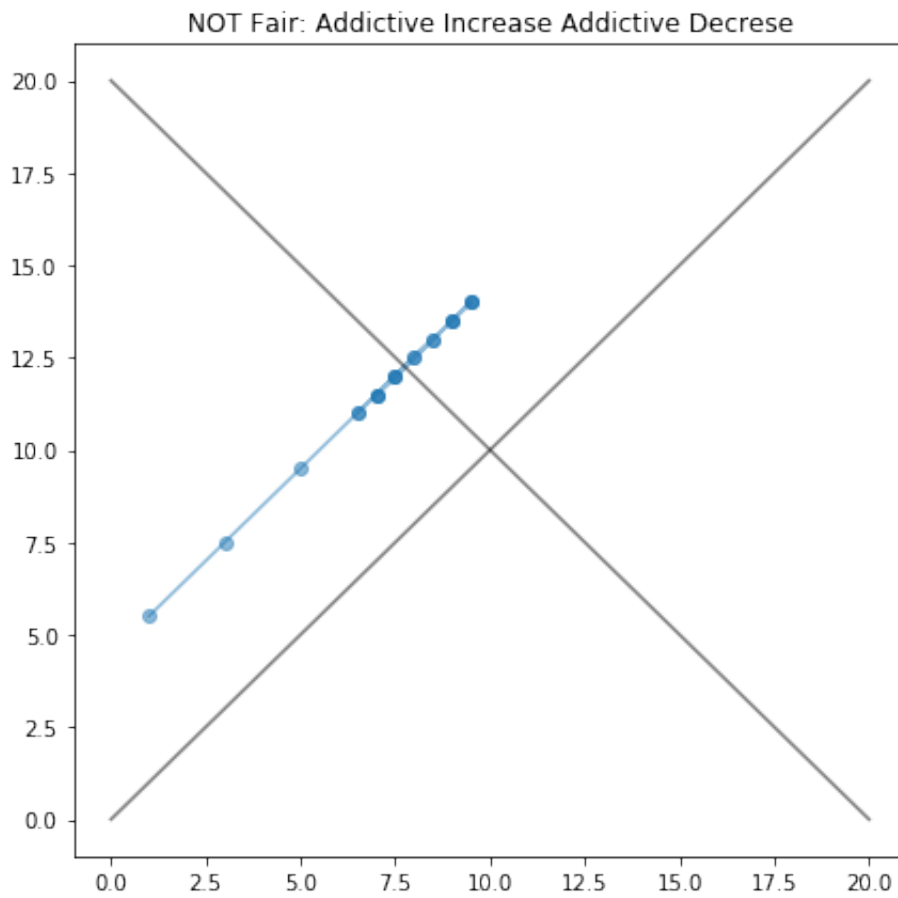
plt.figure(figsize=(7,7))
plt.plot(array[0], array[1], alpha=0.5, marker = 'o')
x1, y1 = [0, 20], [0, 20]
x2, y2 = [0, 20], [20, 0]
plt.plot(x1, y1, x2, y2, alpha=0.5, color='0')
plt.title('NOT Fair: Multiplicative Increase Multiplicative Decrease')
plt.show()
```



Not Fair: Multiplicative Increase Multiplicative Decrease

```
In [127]: def aiad(x, y):  
    '''Addictive Increase Addictive Decrease  
    '''  
    total = x + y  
    points = [[x, y]]  
    for i in range(0, 20):  
        size = len(points)  
        point = points[size-1]  
        x = point[0]  
        y = point[1]  
        if x + y < 20: # increase  
            x += 2  
            y += 2  
        else: # decrease  
            x -= 1.5  
            y -= 1.5  
        points.append([x, y])  
    return points
```

```
In [128]: array = np.transpose(aiad(1, 5.5))  
  
plt.figure(figsize=(7,7))  
plt.plot(array[0], array[1], alpha=0.5, marker = 'o')  
x1, y1 = [0, 20], [0, 20]  
x2, y2 = [0, 20], [20, 0]  
plt.plot(x1, y1, x2, y2, alpha=0.5, color='0')  
plt.title('NOT Fair: Addictive Increase Addictive Decrease')  
plt.show()
```



Not Fair: Addictive Increase Addictive Decrease