L2 PROBLEM 4 (3/3 points)

1. Are the following two distributions equivalent?

```
import random
def dist1():
    return random.random() * 2 - 1

def dist2():
    if random.random() > 0.5:
        return random.random()
    else:
        return random.random() - 1
```

- (•) Yes ✔
- ( ) No

EXPLANATION:

The random.random() distribution is uniform, so both `dist1` and `dist2` are a uniform distribution over [-1.0, 1.0).

2. Are the following two distributions equivalent?

```
import random
def dist3():
    return int(random.random() * 10)

def dist4():
    return random.randrange(0, 10)
```

- (•) Yes ✔
- ( ) No

EXPLANATION:

The random.random() distribution is uniform, and so is the random.randrange() distribution, so both `dist3` and `dist4` are a discrete uniform distribution over [0, 1, 2, 3, 4, 5, 6, 7, 8, 9].

3. Are the following two distributions equivalent?

```
import random
def dist5():
    return int(random.random() * 10)

def dist6():
    return random.randint(0, 10)
```

- ( ) Yes

No ✔

EXPLANATION:

The random.random() distribution is uniform, and so is the random.randint() distribution. However unlike random.randrange(start, end), random.randint(start, end) returns a distribution that is inclusive of both the given start and end points.

Thus `dist5` is a discrete uniform distribution over [0, 1, 2, 3, 4, 5, 6, 7, 8, 9], but `dist6` is a discrete uniform distribution over [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10].

You can code a simple simulation to see what a distribution looks like using dictionaries:

```
d1 = {}
for i in range(10000):
    x = random.randrange(10)
    d1[x] = d1.get(x, 0) + 1
d2 = {}
for i in range(10000):
    x = int(random.random()*10)
    d2[x] = d2.get(x, 0) + 1
d3 = {}
for i in range(10000):
    x = random.randint(0, 10)
    d3[x] = d3.get(x, 0) + 1
```

Examine the values of the three dictionaries to see what sort of distribution results!

Question to ponder: Should all the values of the dictionaries be equal? That is, should `d1[x] == d1[y]` for all values of x and y, where x != y and both x and y are values in [0, 1, 2, 3, 4, 5, 6, 7, 8, 9]?

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