

1. (5 points) Page 67 # 49

How do we get 11?

Combinations	count
6-4-1	6
6-3-2	6
5-5-1	3
5-4-2	6
5-3-3	3
4-3-4	3
Total	27

How do we get 12?

Combinations	count
6-5-1	6
6-4-2	6
6-3-3	3
5-5-2	3
5-4-3	6
4-4-4	1
Total	25

11 is more likely

2. (5 points) Write a program to simulate the area between the curve $f(x)$ and the X -axis for $f(x) = \sin(x) * \cos(x)$ on the interval $(0, 4\pi)$. Area under the curve should be counted as positive value. (Graduate students earn 3 points for this part)

```

lots = 1000000
count = 0
loop lots
    x = rand()*4 * pi
    y = rand()-.5
    if abs(y) < abs(cos(x)*sin(x))
        count++
end loop lots
print Area = 4 * pi * count/lots

```

Graduate students should verify the result of the program using integral calculus (2 points).

$$\begin{aligned}
 u &= \sin(x) \\
 du &= \cos(x)dx \\
 \int_0^{4\pi} |\cos(x) \sin(x)| dx &= 8 \int_0^{\frac{\pi}{2}} \sin(x) \cos(x) dx \\
 &= 8 \int_0^{\sin(\frac{\pi}{2})} u du \\
 &= 8 \int_0^1 u du \\
 &= 8 \frac{1}{2} u^2 \Big|_0^1 \\
 &= 4
 \end{aligned}$$

3. (5 points) pg 119, #1

4	.07
3	.14
2	.34
1	.27
0	.18

4. (5 points) pg 122, #13

Number	possibilities	probability
2	1	$\frac{1}{32}$
3	5	$\frac{5}{32}$
4	10	$\frac{10}{32}$
5	10	$\frac{10}{32}$
6	5	$\frac{5}{32}$
7	1	$\frac{1}{32}$

5. (5 points) pg 122, #14

(a)

$$\begin{aligned}
 p_Y(0) &= p_X(0) + p_X(3) + p_X(6) + p_X(9) = 4/10, \\
 p_Y(1) &= p_X(1) + p_X(4) + p_X(7) = 3/10, \\
 p_Y(2) &= p_X(2) + p_X(5) + p_X(8) = 3/10, \\
 p_Y(y) &= 0, \quad \text{if } y \notin \{0, 1, 2\}.
 \end{aligned}$$

(b)

$$p_Y(y) = \begin{cases} 2/10, & \text{if } y = 0, \\ 2/10, & \text{if } y = 1, \\ 1/10, & \text{if } y = 2, \\ 5/10, & \text{if } y = 5, \\ 0, & \text{otherwise.} \end{cases}$$