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).

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

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)

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

(b)

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