Assignment 2

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Problem1

a.

```
H <- function(n,r){
    return(choose(n+r-1,r))
}
H(6,20)
```

```
## [1] 53130
```

b.

```
H(6,14)
```

```
## [1] 11628
```

Problem2

a.

```
1/choose(12,2)
```

```
## [1] 0.01515152
```

b.

```
choose(10,2)/choose(12,2)
```

```
## [1] 0.6818182
```

Problem3

a.

```
p.die <- 2/3*1/2 + 1/3*1/4
p.die
```

```
## [1] 0.4166667
```

b.

```
# P(didn't take care | die) = P(didn't take care && die)/P(die)
(1/3)*(3/4)/p.die
```

```
## [1] 0.6
```

Problem4

a.

$$f(x) = \begin{cases} 0 & ,if \quad x < 2 \quad or \quad x > 4 \\ -\frac{1}{2}x + 2 & ,if \quad 2 \leq x \leq 4 \end{cases}$$

b.

$$\mathbb{P}(X < 3) = F(3) = 0.75$$
$$\mathbb{P}(X = 4) = 0$$

c.

$$\mathbb{E}(X) = \int_2^4 xf(x)dx = [-\frac{1}{6}x^3 + x^2]_2^4 = \frac{8}{3}$$
$$\mathbb{E}(X^2) = \mathbb{E}(X^2) = \int_2^4 x^2 f(x)dx = \frac{22}{3}$$
$$var(X) = \frac{22}{3} - \frac{64}{9} = \frac{2}{9}$$

Problem5

a.

```
1-pnorm(50,mean=42.1,sd=20.8)
```

```
## [1] 0.3520441
```

b.

```
pnorm(40,mean=42.1,sd=20.8) - pnorm(30,mean=42.1,sd=20.8)
```

```
## [1] 0.1794165
```

Problem6

```
1-pbinom(7,10,0.5)
```

```
## [1] 0.0546875
```

Problem7

a.

poisson distrubution

b.

$$\mathbb{E}(Y) = 3, \quad \mathbb{E}(X) = \frac{1}{3}$$

c.

```
# P(Y=5)
dpois(5,3)
```

```
## [1] 0.1008188
```

```
# P(Y < 1)
dpois(0,3)
```

```
## [1] 0.04978707
```

Problem8

```
print(paste("A single pair: ",choose(4,2)*13*choose(48,3)/choose(52,5)))
```

```
## [1] "A single pair:  0.519087635054022"
```

```
print(paste("Two pairs:
",choose(4,2)*choose(4,2)*choose(13,2)*choose(11,1)*4/choose(52,5)))
```

```
## [1] "Two pairs:  0.0475390156062425"
```

```
print(paste("Tree of a kind ",choose(4,3)*13*choose(48,2)/choose(52,5)))
```

```
## [1] "Tree of a kind  0.0225690276110444"
```

```
print(paste("Flush: ",4*(choose(13,5)-9)/choose(52,5)))
```

```
## [1] "Flush:  0.00196694062240281"
```

```
print(paste("Full House ",13*choose(4,3)*12*choose(4,2)/choose(52,5)))
```

```
## [1] "Full House  0.0014405762304922"
```

```
print(paste("Four of a kind",13*12*4/choose(52,5)))
```

```
## [1] "Four of a kind 0.000240096038415366"
```

```
print(paste("Straight Flush: ",4*9/choose(52,5)))
```

```
## [1] "Straight Flush:  1.38516945239634e-05"
```