1. Write a `pois.prob()` function that computes $P(X = x)$, $P(X \neq x)$, $P(X < x)$, $P(X \leq x)$, $P(X > x)$, and $P(X \geq x)$. Enable the user to specify the rate parameter λ.

```r
pois.prob <- function(x, size, prob, type="<="){
  # Use dpois and ppois to conditionally return the correct probability
  lambda = prob* size
  if(type == "="){
    return(dpois(x=x, lambda = lambda))
  }else if(type == "!="){
    return(1 - dpois(x=x, lambda = lambda))
  }else if(type == "<"){
    return(ppois(q=(x-1), lambda = lambda))
  }else if(type == ">"){
    return(1 - ppois(q=x, lambda = lambda))
  }else if(type == ">="){
    return(1 - ppois(q=(x-1), lambda = lambda))
  }else if(type == "<="){
    return(ppois(q=x, lambda = lambda))
  }

}
#testing all
pois.prob(5, 10, 0.5, type = "=")
```

```
## [1] 0.1754674
```

```r
pois.prob(5, 10, 0.5, type = "!=")
```

```
## [1] 0.8245326
```

```r
pois.prob(5, 10, 0.5, type = ">=")
```

```
## [1] 0.5595067
```

```r
pois.prob(5, 10, 0.5, type = "<")
```

```
## [1] 0.4404933
```

```r
pois.prob(5, 10, 0.5, type = "<=")
```

```
## [1] 0.6159607
```

```r
pois.prob(5, 10, 0.5, type = ">")
```

```
## [1] 0.3840393
```

2. Write a `beta.prob()` function that computes $P(X = x)$, $P(X \neq x)$, $P(X < x)$, $P(X \leq x)$, $P(X > x)$, and $P(X \geq x)$ for a beta distribution. Enable the user to specify the shape parameters α and β.

```r
# beta dist uses a(prob of occuring) and b(prob of not)
beta.prob <- function(x, size, prob, type="<="){
  # Use dbeta and pbeta to conditionally return the correct probability
  a = prob* size
  b = size *(1-prob)
  if(type == "="){
    return(dbeta(x = x, a, b))
  }else if(type == "!="){
    return(1 - dbeta(x = x, a, b))
  }else if(type == "<"){
    return(pbeta(q = x, a, b))
  }else if(type == ">"){
    return(1 - pbeta(q = x, a, b))
  }else if(type == ">="){
    return(1 - pbeta(q = x, a, b))
  }else if(type == "<="){
    return(pbeta(q = x, a, b))
  }

}
beta.prob(0.3, 10, 0.3, type = "=")
```

1

```
## [1] 2.668279

beta.prob(0.3, 10, 0.3, type = "!=")

## [1] -1.668279

beta.prob(0.3, 10, 0.3, type = ">")

## [1] 0.4628312

beta.prob(0.3, 10, 0.3, type = "<=")

## [1] 0.5371688

beta.prob(0.3, 10, 0.3, type = "<")

## [1] 0.5371688

beta.prob(0.3, 10, 0.3, type = ">=")

## [1] 0.4628312
```