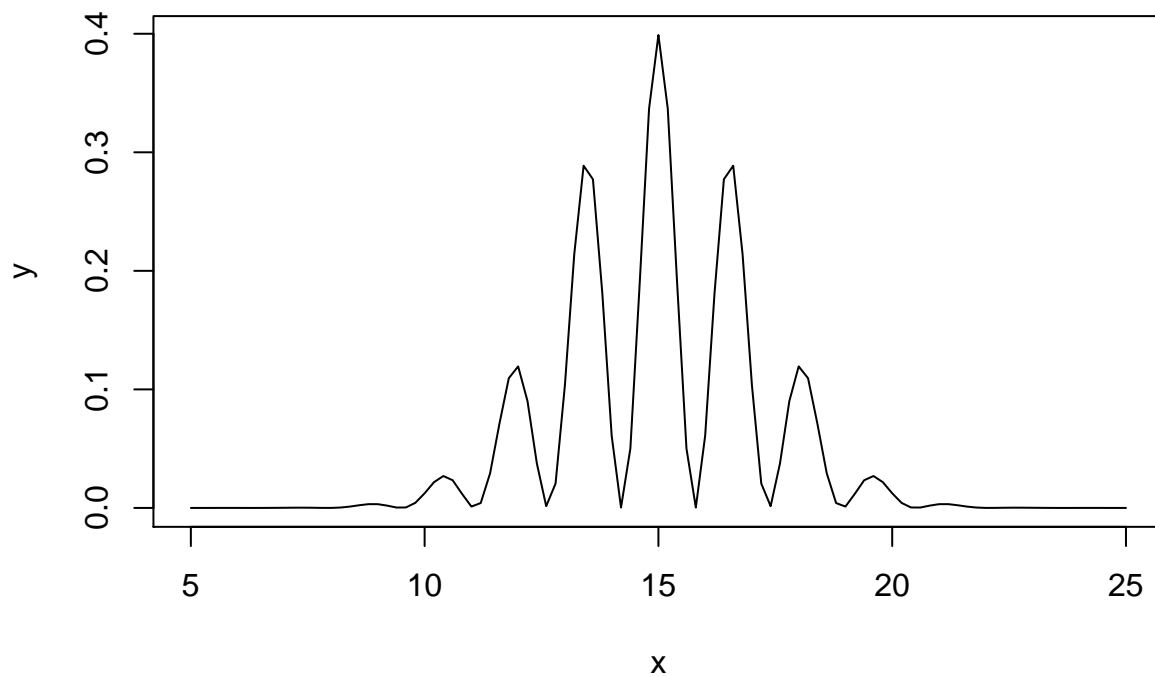# Math-final-exam-ajeya

Ajeya Kempegowda
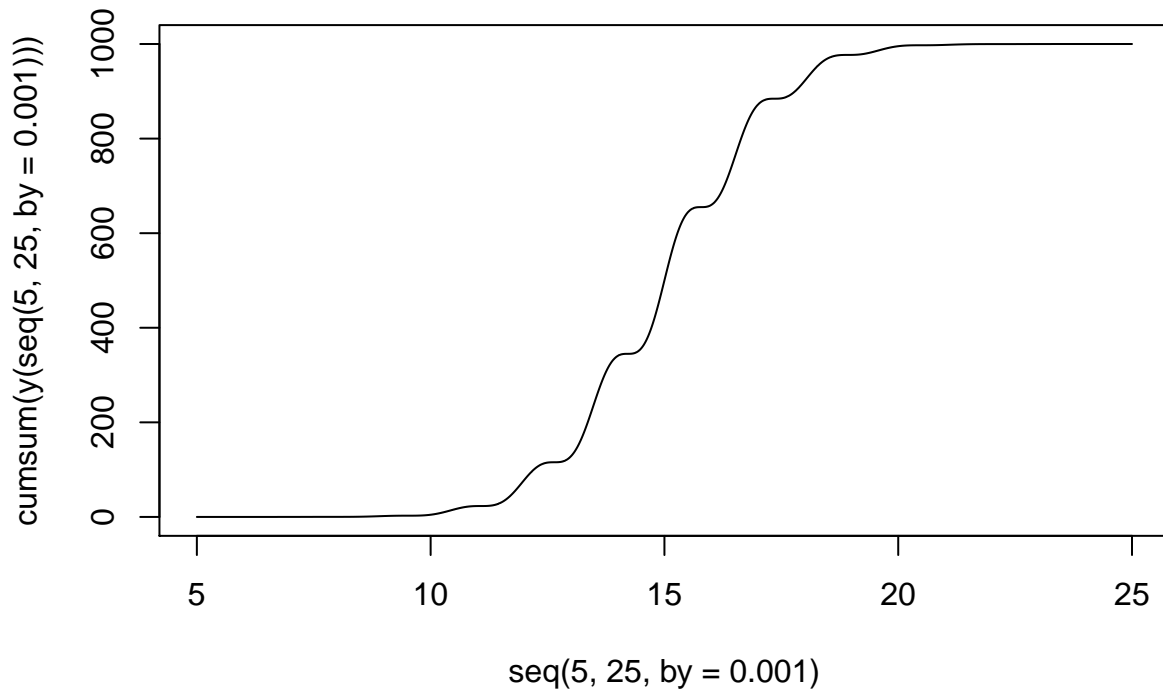
12/11/2018

Problem 5.a

```r
s=2
mu=15
y <- function(x)((1/s)*sqrt(2/pi) * exp(-((x-mu)^2)/(2*s^2))*cos((x-mu)*s)^2)
#the pdf given by:
plot(y, 5,25, type="l", lwd=1)
```



```r
#the cdf is given by
plot(seq(5,25,by=0.001), cumsum(y(seq(5,25,by=0.001)) ), type="l" )
```

1

```r
# To verify it's avalid PDF: Integral evaluates to 1
integrate(y,5,25)
```

```
## 0.9999997 with absolute error < 4e-07
```

Problem 5.b

```r
# The Probabilties cannot be defined at a specific value for a continuous
# function as the integral tends to zero(integral with same limits = 0)
```

Problem 5.c

```r
integrate(y,14,16)
```

```
## 0.3192692 with absolute error < 1.7e-14
```

Problem 5.d

```r
# solution: The expected count is defined as Expected outcome=n×Pr(that outcome)
# The probability at X=13 is Zero as the limits of the integrals are the same
# (lower limit = 13 = upper limit). Therfore, the expected count at 13 turns to
# Zero

# On the other hand the Expected outcome of the particle could be defined in a region
# i.e between(13,16) or (10,12) but cannot be defined at a point, as the probability
# (the integral turns to zero). If the question was - Expected count around 13
# could lead a meaning answer
```