STAT 400 - Discussion 3

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Poisson - By hand

```
# Define parameters
lambda <- 4  # Average rate (mean)
k <- 6       # Number of occurrences

e <- exp(1)
numerator <- (lambda^k) * (e^(-lambda))
denominator <- factorial(k)

poisson_prob_hand <- numerator / denominator

cat("Manual Poisson Probability:", poisson_prob_hand, "\n")
```

```
Manual Poisson Probability: 0.1041956
```

Poisson - Function

```
poisson_prob <- dpois(k, lambda)

print(poisson_prob)
```

```
[1] 0.1041956
```

Gamma - By hand

```r
# Manual implementation of the Gamma function
gamma_integral <- function(t, n) {
  t^(n - 1) * exp(-t)
}

gamma_manual <- integrate(gamma_integral, lower = 0, upper = Inf, n = 5)$value

cat("Gamma(5):", gamma_manual, "\n")
```

```
Gamma(5): 24
```

Gamma - Function

```r
gamma_result <- gamma(5)

cat("Gamma(5):", gamma_result, "\n")
```

```
Gamma(5): 24
```