Code

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To evaluate the posterior probability

$$Pr(\mu_{\text{Tue}} > \mu_{\text{Mon}}|x, \alpha_0, \beta_0) = \int_0^{+\infty} \int_{\mu_{\text{Mon}}}^{+\infty} f(\mu_{\text{Tue}}|x, \alpha_0, \beta_0) f(\mu_{\text{Mon}}|x, \alpha_0, \beta_0) d\mu_{\text{Tue}} d\mu_{\text{Mon}}.$$

```
### 2 Aug 2021
# By EM
# evaluating posterior probability

rm(list=ls())

mu.mon <- rgamma(10^4, 750, 11)
mu.tue <- rgamma(10^4, 765, 11)

hist(mu.mon)

## Pr(mu.tue > mu.mon|data)

mean(mu.tue>mu.mon)
```

To evaluate the posterior predictive probability:

$$Pr(\tilde{x} > 80|x, \alpha_0, \beta_0)$$

```
### Pr(x.tilde > 80 | data)

# 1. simulate 10^4 mus from the post. dist
# 2. simulate 10^4 new x from the likelihood
mu.mon <- rgamma(10^4, 750, 11)
x.tilde <- rpois(10^4,mu.mon)

mean(x.tilde>80)

quantile(x.tilde,.99)
```

Which day-of-the-week has the highest average demand?

```
### which DoW has the highest demand
mu.wed <- rgamma(10^4, 772, 11)
mu.thu <- rgamma(10^4, 763, 11)
mu.fri <- rgamma(10^4, 770, 11)

mu.table <- cbind(mu.mon,mu.tue,mu.wed,mu.thu,mu.fri)
```

```r
DoW <- apply(mu.table,1,which.max)

table(DoW)/length(DoW)


## ratio tue/mon
ratio.t.m <- mu.tue/mu.mon
mean(ratio.t.m)
quantile(ratio.t.m,c(.025,.975))
```