More generally, let's analyse the time taken by the model and the emulator to evaluate ever-increasing sets of points. In the following plot we compare $n$ model evaluations with $10n$ emulator evaluations, for $n$ up to $50$.

```{r}

test\_LH <- 2\*(maximinLHS(500, 4)-1/2)

test\_LH <- data.frame(t(apply(test\_LH, 1, function(x) x\*r\_scales + r\_centers)))

model\_timings <- c()

emulator\_timings <- c()

for (i in 1:(nrow(test\_LH)/10)) {

s\_t <- Sys.time()

getOutputs(test\_LH[1:i,], seq(10, 30, by = 5))

model\_timings <- c(model\_timings, Sys.time() - s\_t)

s\_t <- Sys.time()

purrr::map(ems0\_adjusted, ~.$get\_exp(test\_LH[1:(10\*i),]))

emulator\_timings <- c(emulator\_timings, Sys.time() - s\_t)

}

plot(3:length(model\_timings), model\_timings[3:length(model\_timings)], type = 'l', xlab = 'Number of points', ylab = "Time taken to evaluate (seconds)")

lines(3:length(emulator\_timings), emulator\_timings[3:length(emulator\_timings)], col = 'blue')

legend('topleft', inset = 0.01, lty = 1, col = c('black', 'blue'), legend = c("Model", "Emulator (10x points)"))

```

We see that it takes roughly the same amount of time to run the model $n$ times and the emulator $10n$ times.