

THE UNIVERSITY OF
SYDNEY

STAT3023 Statiscal Inference

Lab Week 13: Revision of all labs

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Contents

1	Lab 7	2
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Lab 7

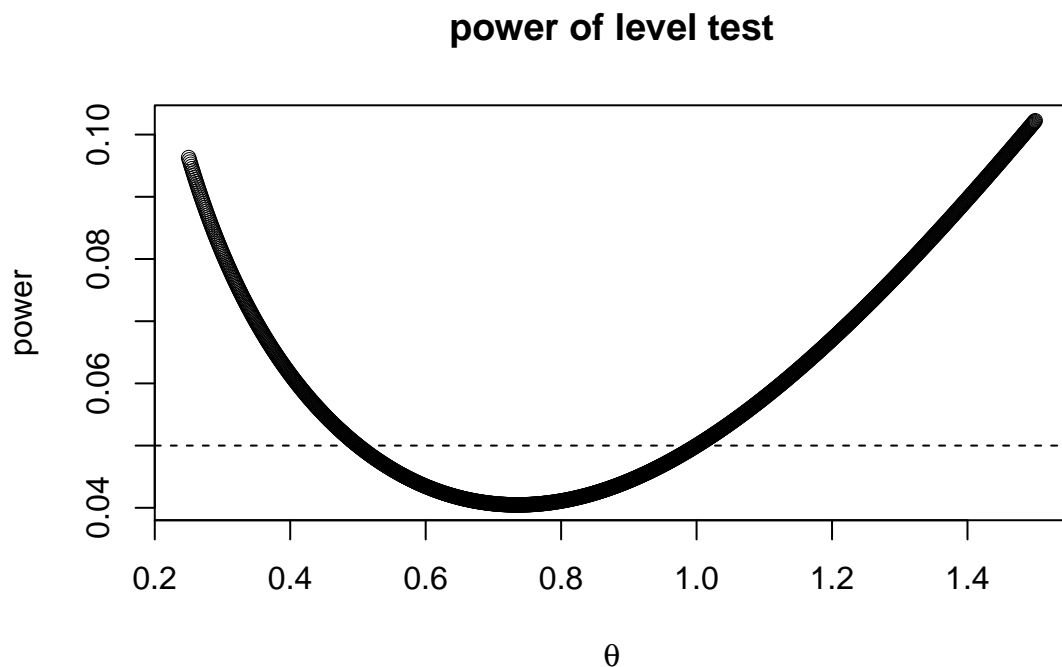
1. (a) We assume a null hypothesis of $\theta = \theta_0 = 1$. We are given that $\gamma_0 = 1$.

```
1 alpha = 0.05
2 # find a and b
3 a = qgamma(p = alpha/2, shape = 1, scale = 1, lower.tail = TRUE)
4 b = qgamma(p = alpha/2, shape = 1, scale = 1, lower.tail = FALSE)
5 c(a, b)
```

```
1 [1] 0.02531781 3.68887945
```

- (b) We plot the power function of the equal tailed test

```
1 # Define a vector of theta-values
2 th = (250:1500)/1000
3 # obtain a corresponding vector of values of the power
4 power_level = pgamma(q = a, shape = 1, scale = th, lower.tail = TRUE) + pgamma
5   (q = b, shape = 1, scale = th,
6   lower.tail = FALSE)
7 # Plot power against theta
8 plot(th, power_level, xlab = expression(theta), ylab = "power", main = "power
9   of level test", lwd = 0.5)
10 # dashed line
11 abline(h = 0.05, lty = 2)
```



- (c) We write a function which takes a level α and returns the elements c and d for the UMPU test. We do this for $\theta_0 = 1$ and $\alpha = 0.05$