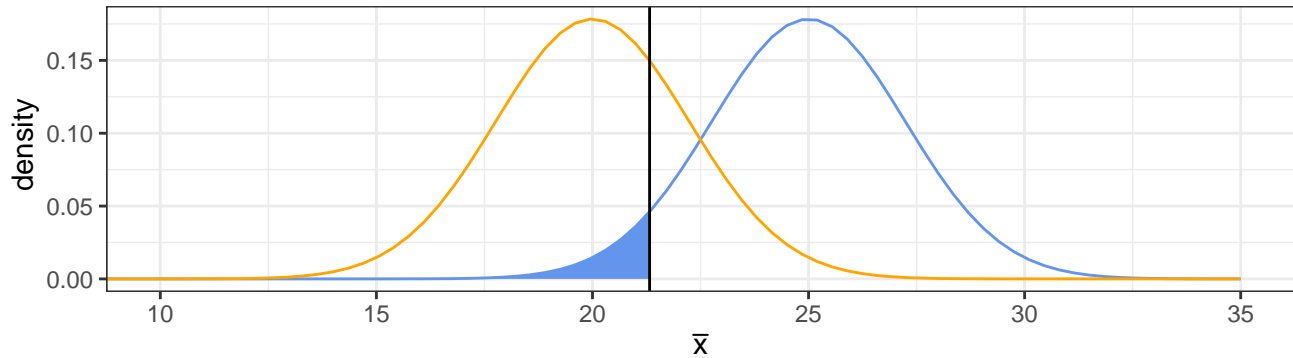


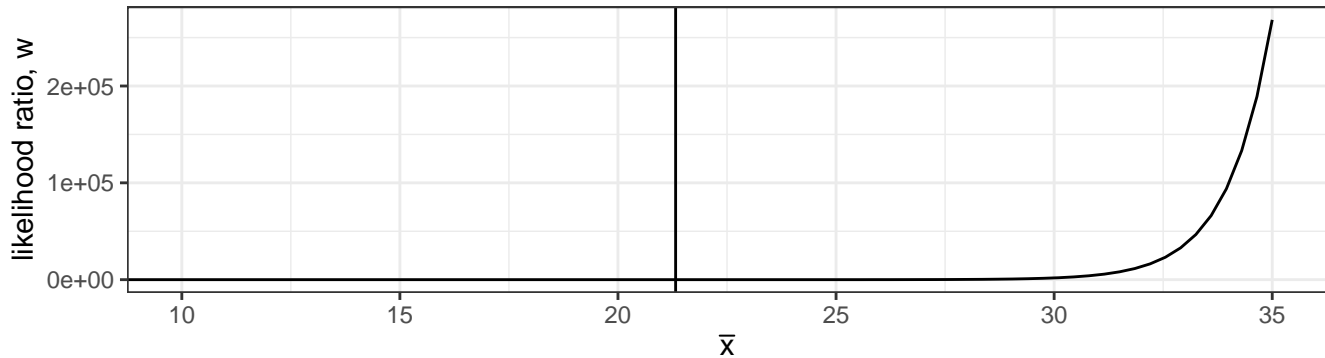
# Likelihood Ratios

- Data Model:  $X_1, \dots, X_5 \stackrel{\text{i.i.d.}}{\sim} \text{Normal}(\theta, 5^2)$
- Let's consider a test of the hypotheses  $H_0 : \theta = 25$  vs.  $H_A : \theta = 20$
- If  $H_0$  is correct, then  $\bar{X} \sim \text{Normal}(25, 5^2/5)$ . If  $H_A$  is correct, then  $\bar{X} \sim \text{Normal}(20, 5^2/5)$
- Two ways to think of the specification of the rejection region for the likelihood ratio test:

1. Reject  $H_0$  if  $\bar{x} \leq 21.322$



2. Reject  $H_0$  if  $W \leq w^*$  where  $W$  is the likelihood ratio statistic



The scale of the likelihood ratio is challenging; let's look at the log:

