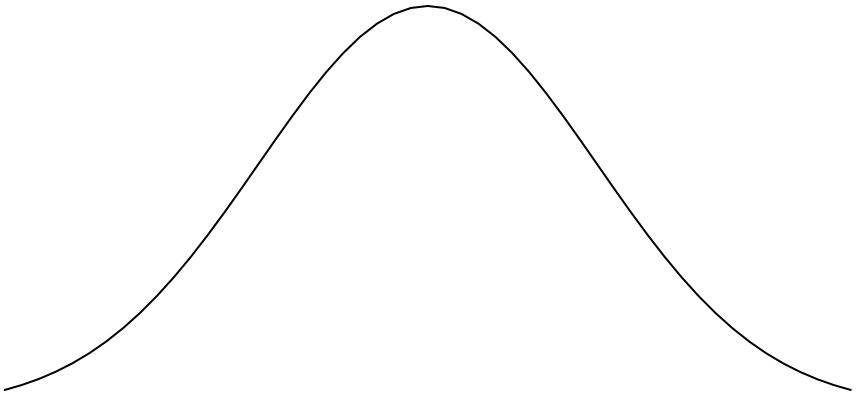
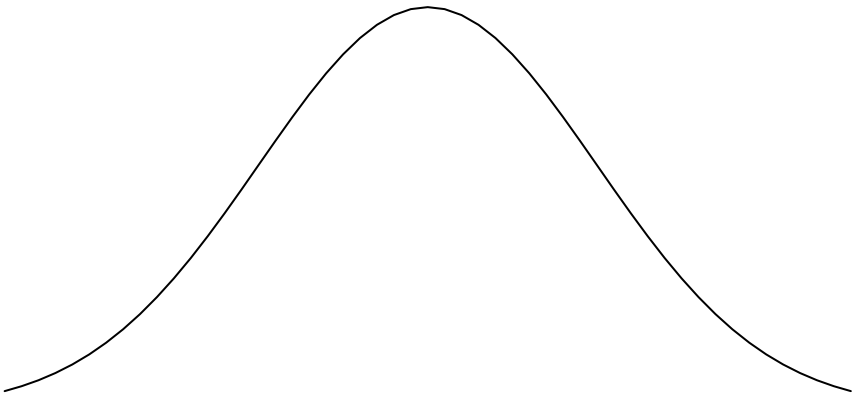
Ordinal Regression

Categorical Data

Models for Ordinal Data

Recall the latent formulation for probit model





Vegetation Coverage Class Data Plant coverage is an important ecological indicator. However, estimating plant coverage can be difficult and is often summarized in an ordinal manner.

```
class <- shoshveg  %>%
          mutate(class = case_when(
            ABILAS <= .5 ~ 1,
            ABILAS > .5 & ABILAS <= 3  ~ 2,
            TRUE ~3)) %>%
          mutate(class = factor(class)) %>%
          dplyr::select(class) %>% pull()

plant_cover <- tibble(class = class, elevation = scale(shoshsite$elevation))
```

```
ord <- polr(class ~ elevation, data = plant_cover, method = 'probit')
summary(ord)
```

```
##
## Re-fitting to get Hessian
```

```
## Call:
## polr(formula = class ~ elevation, data = plant_cover, method = "probit")
##
## Coefficients:
##            Value Std. Error t value
## elevation 0.3129     0.1034   3.026
##
## Intercepts:
##     Value  Std. Error t value
## 1|2 0.2226 0.1057     2.1050
## 2|3 1.4634 0.1520     9.6258
##
## Residual Deviance: 256.0104
## AIC: 262.0104
```

```
bayes_ord <- stan_polr(class ~ elevation, data = plant_cover, method = 'probit',
          prior = R2(0.25, 'mean'), refresh = 0)
print(bayes_ord, digits = 2)
```

```
## stan_polr
##  family:       ordered [probit]
##  formula:      class ~ elevation
##  observations: 150
## ------
##           Median MAD_SD
## elevation 0.30   0.10
##
## Cutpoints:
##     Median MAD_SD
## 1|2 0.21   0.10
## 2|3 1.44   0.15
##
## ------
## * For help interpreting the printed output see ?print.stanreg
## * For info on the priors used see ?prior_summary.stanreg
```