

EEB 5301 Homework 4
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Spring 2017

Problem 1

Problem 2

Part a

```
specnumber(dune.sum1)
```

```
## 1 2 4 5  
## 20 19 13 21
```

As moisture increases, species richness decreases from moisture level 1 to level 4, but then suddenly increases at level 5. The most rich is level 5 while level 4 is the least rich.

Part b

```
sort(diversity(dune.sum1))
```

```
## 4 1 2 5  
## 2.486948 2.702316 2.765128 2.784814
```

According to Shannon's Index, the moisture level is ranked $5 > 2 > 1 > 4$ in order of high diversity to lowest.

Part c

```
sort(exp(diversity(dune.sum1)))
```

```
## 4 1 2 5  
## 12.02452 14.91423 15.88107 16.19680
```

```
sort(1/(diversity(dune.sum1, index = "invsimpson")))
```

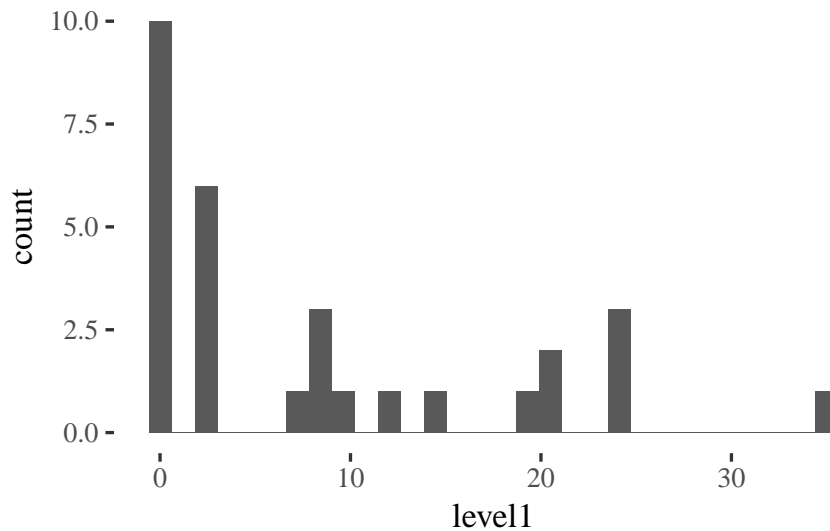
```
## 2 5 1 4  
## 0.07066360 0.07292591 0.07846400 0.08888514
```

The effective number of species between Simpson's and Shannon's index are almost flipped. Moisture level 4 has the lowest effective number of species according to Shannon's index while the level 4 is considered the having the highest effective number of species according to Simpson's.

Part d

```
dumdum <- data.frame(level1 = as.numeric(dune.sum1[1,
  ]))
ggplot(dumdum, aes(level1)) + geom_histogram() +
  theme_tufte()

## 'stat_bin()' using 'bins = 30'. Pick
## better value with 'binwidth'.
```



There are approximately 6 individuals that appear twice at moisture level 1. Out 250 individuals the probability is 2.4%.

Part e

```
radPlot(x = dune.sum1[1, ], bty = "n")

## Warning in title(...): font width unknown for
## character 0x9

## Warning in title(...): font width unknown for
## character 0x9

## NULL

radPlot(x = dune.sum1[2, ], add = TRUE, col = "blue")

## NULL

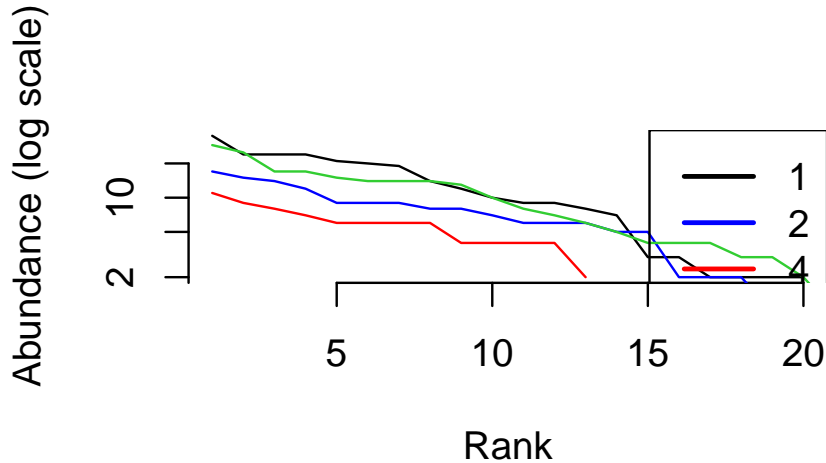
radPlot(x = dune.sum1[3, ], add = TRUE, col = "red")

## NULL

radPlot(x = dune.sum1[4, ], add = TRUE, col = "limegreen")
```

```
## NULL
```

```
legend("topright", legend = c("1", "2", "4", "5"),
      col = c("black", "blue", "red", "limegreen"),
      lty = 1, lwd = 2)
```



Part f

Based on the plot above, moisture level 1, appears to be the most even since it has the flattest slope. However, this is not much flatter than level 5 and not easily interpreted.

One way to better quantify evenness would be to calculate the Hill's ratio from either of the diversity indices above.

Part g

Simpson's index tends to be less sensitive to rare species than Shannon's index. It is weighted towards the most abundant species. In part c, Simpson's index tended to favor level 4 as the most diverse, which makes sense from the graph in part e that shows level 4 as the most dominated by common abundant species (i.e. lack of sensitivity towards rare species).

Part h

Part i