Chapter 6 Homework

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```
library(rethinking)
```

```
## Loading required package: rstan
```

```
## Loading required package: ggplot2
```

```
## Loading required package: StanHeaders
```

```
## rstan (Version 2.18.2, GitRev: 2e1f913d3ca3)
```

```
## For execution on a local, multicore CPU with excess RAM we recommend calling
## options(mc.cores = parallel::detectCores()).
## To avoid recompilation of unchanged Stan programs, we recommend calling
## rstan_options(auto_write = TRUE)
```

```
## For improved execution time, we recommend calling
## Sys.setenv(LOCAL_CPPFLAGS = '-march=native')
## although this causes Stan to throw an error on a few processors.
```

```
## Loading required package: parallel
```

```
## rethinking (Version 1.59)
```

```
library(tidyverse)
```

```
## -- Attaching packages ---------------------------------------------------------------- tidyverse 1.2.
```

```
## v tibble  2.0.1     v purrr   0.2.5
## v tidyr   0.8.2     v dplyr   0.7.8
## v readr   1.3.1     v stringr 1.3.1
## v tibble  2.0.1     v forcats 0.3.0
```

```
## -- Conflicts ------------------------------------------------------------------- tidyverse_conflicts()
## x tidyr::extract() masks rstan::extract()
## x dplyr::filter()  masks stats::filter()
## x dplyr::lag()     masks stats::lag()
## x purrr::map()     masks rethinking::map()
```

Easy problems

6E1

The three motivating criteria that define information entropy are:
a) it should be a continuous measure such that it is not sensitive to small changes
b) it should always increase as the number of possible things that could occur (events) increases, because this necessarily makes accuracy more difficult
c) if the number of possible events is greater than two, it should be additive in its approach - i.e. it should sum all of the separate pairs of uncertainties.

6E2

```
p <- c(0.7,0.3)
(e <- -sum( p*log(p) ))
```

```
## [1] 0.6108643
```

The entropy of this coin is 0.6108643.

6E3

```
p <- c(0.2, 0.25, 0.25, 0.3)
(e <- -sum( p*log(p) ))
```

```
## [1] 1.376227
```

The entropy of this die is 1.3762266.

6E4

```
p <- c(1/3, 1/3, 1/3)
(e <- -sum( p*log(p) ))
```

```
## [1] 1.098612
```

The entropy of this die is 1.0986123.