Uniform Random Variables

Problem 1

Compute the following in N(0,1).

(a) $P(Z < -0.6)$

```
pnorm(-0.6)
```

```
[1] 0.2742531
```

(b) $P(Z > 1.3)$

```
1 - pnorm(1.3)
```

```
[1] 0.09680048
```

(c) $P(-1.2 \leq Z \leq 2.1)$

```
pnorm(2.1) - pnorm(-1.2)
```

```
[1] 0.8670659
```

Problem 2

The speed of a car on cruise control has a normal distribution with mean $\mu = 72$ mph and standard deviation $\sigma = 1.1$ mph.

(a) Find the Z-score corresponding to a speed of 70 mph.

Answer:

$$\frac{70 - 72}{1.1} = -1.82$$

(b) Compute the probability that the car is traveling more than 70 mph at a random moment using the Z-score from part (a).

```r
pnorm(-1.82)
```

```
[1] 0.0343795
```

(c) Check your answer from part (b) using $N(72, 1.1^2)$.

```r
pnorm(70,72,1.1)
```

```
[1] 0.03451817
```

Inverse normal calculations

Problem 1

Find the z-score that has 44% of the distribution to its left.

Answer:

```
qnorm(0.44)
```

```
[1] -0.1509692
```

Problem 2

Find the value in $N(12, 32)$ that has 87% of the distribution to its right.

Answer:

```
qnorm(1 - 0.87,12,3)
```

```
[1] 8.620827
```

Problem 3

The average daily high temperature in June in LA is 77F with a standard deviation of 5F. Suppose that the temperatures in June closely follow a normal distribution.

(a) What is the probability of observing an 83F temperature or higher in LA during a randomly chosen day in June?

Answer:

```
1 - pnorm(83,77,5)
```

```
[1] 0.1150697
```

(b) How cool are the coldest 10% of the days (days with lowest high temperature) during June in LA?

Answer:

```r
qnorm(0.1,77,5)
```

```
[1] 70.59224
```

Problem 4

Small bags of chips have weights that are normally distributed with mean $\mu = 1.55$ oz and standard deviation $\sigma = 0.06$ oz.

(a) What is the probability that a randomly-selected bag of chips weighs less than 1.50 oz?

Answer:

```r
pnorm(1.5, 1.55, 0.06)
```

```
[1] 0.2023284
```

(b) What is the 98th percentile of weights?

Answer:

```r
qnorm(0.98, 1.55, 0.06)
```

```
[1] 1.673225
```