Question 3: Betting on Roulette

A casino offers a House Special bet on roulette, which is a bet on five pockets (00, 0, 1, 2, 3) out of 38 total pockets. The bet pays out 6 to 1. In other words, a losing bet yields -$1 and a successful bet yields $6. A gambler wants to know the chance of losing money if he places 500 bets on the roulette House Special.

The following 7-part question asks you to do some calculations related to this scenario.

Question 3a

1/1 point (graded)
What is the expected value of the payout for one bet?

-0.07894737

✔ **Answer: -0.0789**

−0.07894737

Explanation
The expected value can be calculated using the following code:

```
p <- 5/38
a <- 6
b <- -1
mu <- a*p + b*(1-p)
mu
```
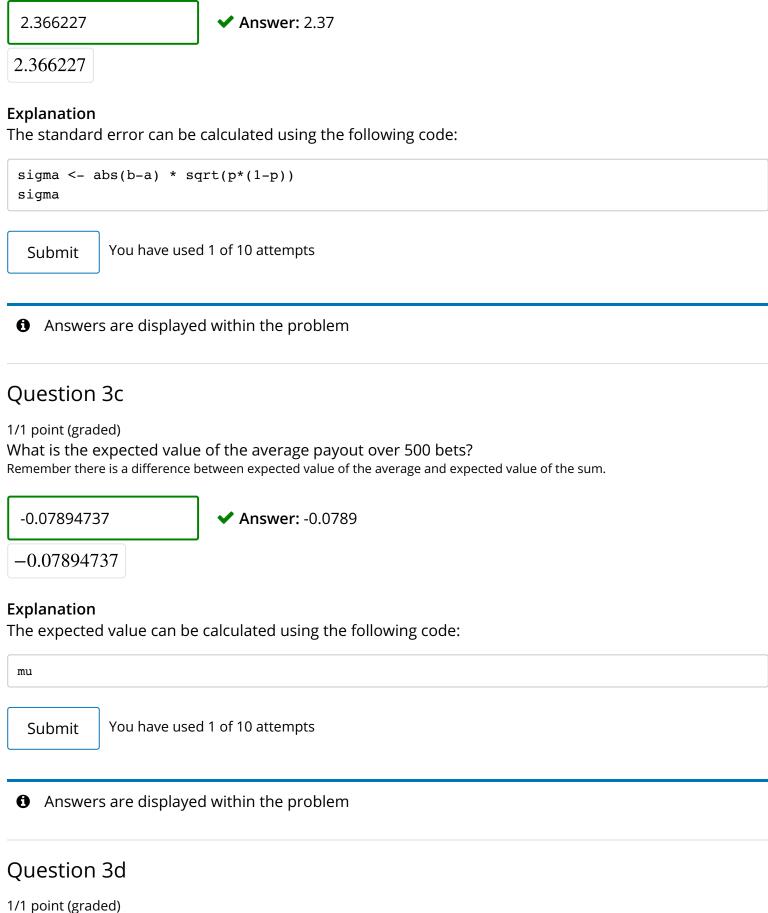
Submit	You have used 1 of 10 attempts

ⓘ Answers are displayed within the problem

Question 3b

1/1 point (graded)
What is the standard error of the payout for one bet?

| 2.366227 | ✔ **Answer:** 2.37 |

| 2.366227 |

Explanation

The standard error can be calculated using the following code:

```
sigma <- abs(b-a) * sqrt(p*(1-p))
sigma
```

ⓘ Answers are displayed within the problem

Question 3c

1/1 point (graded)
What is the expected value of the average payout over 500 bets?
Remember there is a difference between expected value of the average and expected value of the sum.

| -0.07894737 | ✔ **Answer:** -0.0789 |

| −0.07894737 |

Explanation

The expected value can be calculated using the following code:

```
mu
```

ⓘ Answers are displayed within the problem

Question 3d

1/1 point (graded)
What is the standard error of the average payout over 500 bets?
Remember there is a difference between the standard error of the average and standard error of the sum.

| 0.1058209 | ✔ **Answer:** 0.106 |

| 0.1058209 |

Explanation

The standard error can be calculated using the following code:

```
n <- 500
sigma/sqrt(n)
```

Submit   You have used 1 of 10 attempts

ⓘ   Answers are displayed within the problem

Question 3e

1/1 point (graded)
What is the expected value of the sum of 500 bets?

-39.47368   ✔ **Answer: -39.5**

-39.47368

Explanation

The expected value can be calculated using the following code:

```
n*mu
```

Submit   You have used 1 of 10 attempts

ⓘ   Answers are displayed within the problem

Question 3f

1/1 point (graded)
What is the standard error of the sum of 500 bets?

52.91045   ✔

52.91045

Submit   You have used 1 of 10 attempts

✔   Correct (1/1 point)

Question 3g

Use `pnorm` with the expected value of the sum and standard error of the sum to calculate the probability of losing money over 500 bets, $\Pr(X \leq 0)$.

0.7721805

✔ **Answer:** 0.772

0.7721805

Explanation
The standard error can be calculated using the following code:

```
pnorm(0, n*mu, sqrt(n)*sigma)
```

Submit	You have used 1 of 10 attempts

ℹ Answers are displayed within the problem