Quiz 2 - DSC 10, Spring 2026

Full Name:

PID:

Quiz Time: ◯ 3PM ◯ 3:30PM ◯ 4PM ◯ 4:30PM

Instructions:

- This quiz consists of 5 questions. You have a total of 20 minutes to complete it.
- Please write **clearly** in the provided answer boxes; we will not grade work that appears elsewhere. Completely fill in bubbles and square boxes; if we cannot tell which option(s) you selected, you may lose points.

  ◯ A bubble means that you should only **select one choice**.

  ☐ A square box means you should **select all that apply**.
- If your answer is a string, make sure to put it in quotes. If your answer is a float, make sure to include a decimal point.
- You may use one handwritten sheet of notes. No calculators and no computers.
- Assume we have already run `import babypandas as bpd` and `import numpy as np`.

By signing below, you are agreeing that you will behave honestly and fairly during and after this quiz.

Signature:

Version A

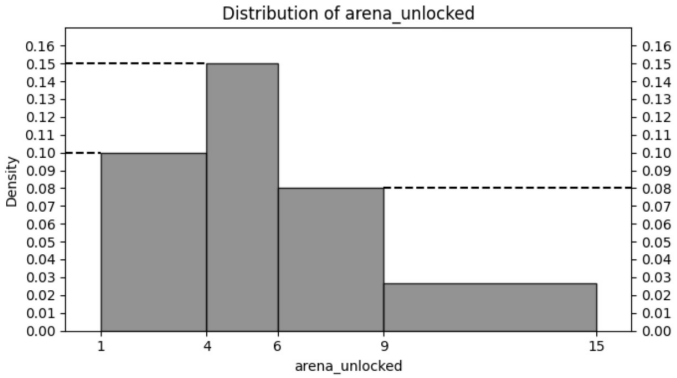
Please do not open your quiz until instructed to do so.

Clash Royale is a mobile game where players build decks of cards and use the abilities provided by those cards to destroy their opponent's defenses. The DataFrame `cards` describes the cards in the game. `cards` is indexed by card `"name"` and has columns:

- `"damage"` (int): amount of damage dealt by the card
- `"type"` (str): card type, either `"spell"`, `"troop"`, or `"building"`
- `"rarity"` (str): card rarity, either `"common"`, `"rare"`, or `"epic"`
- `"arena_unlocked"` (int): a number 1 through 14 representing the stage of the game in which the card can be used

`cards` has **40 rows** and is **sorted** in ascending order of `"arena_unlocked"`. The first six rows are shown on the left. The distribution of `"arena_unlocked"` in the full DataFrame of 40 rows is shown on the right.

name	damage	type	rarity	arena_unlocked
Arrows	1200	spell	common	1
Zap	1200	spell	rare	1
Ice Spirit	1200	spell	common	2
Fire Spirit	460	troop	rare	2
Skeletons	460	troop	rare	2
Goblins	460	troop	common	3



Question 1

a) Using the density histogram above, how many cards have an `"arena_unlocked"` that is **strictly less than 6**?

b) Give a **mathematical expression** that evaluates to the exact height of the rightmost bin in the histogram above. You do not need to simplify.

Question 2

Assume you also have access to another DataFrame, `bonus`, shown in full at right. Determine the number of rows in `cards.merge(bonus, on="arena_unlocked")`.

	arena_unlocked	bonus
0	1	0
1	1	1
2	2	0

PID: _____

Question 3

Fill in the blanks to add a new column `"unlock"` containing strings of the form `"Arena k"` where `k` is the corresponding value in the `"arena_unlocked"` column (e.g. `3` → `"Arena 3"`).

```
def make_unlock(arena_num):
    return __(a)__
cards = cards.assign(unlock=__(b)__)
```

(a): _____

(b): _____

Question 4

Fill in the blanks below so the code prints the `"type"` and `"rarity"` combination for which the average `"damage"` is greatest.

```
grouped = (cards.groupby(__(a)__).mean().reset_index()
                .sort_values(by=__(b)__, ascending=__(c)__))
print("type", grouped.get("type").iloc[0])
print("rarity", grouped.get("rarity").iloc[0])
```

(a): _____

(b): _____ (c): _____

Question 5

Suppose `d` is an array of length 40, containing integers representing the damage done by each card in `cards`. Likewise, suppose `c` is an array of length 40, containing integers representing the cost of each card in `cards`. Fill in the blanks below to calculate the number of cards, `n`, for which the damage is more than 400 times the cost.

```
n = __(a)__
for i in np.arange(__(b)__):
    if d[i] > 400 * c[i]:
        n = __(c)__
```

(a): _____ (b): _____ (c): _____

Reminders:

- **Write your PID** on the front page and next to the PID line in the header on pages where it appears.
- If your answer is a string, make sure to put it in **quotes**.
- If your answer is a float, make sure to include a **decimal point**.
- Stay in your seat until the quiz is over. No leaving early.