CS 320 Exam 2 (14%) - Fall 2022

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Fill in these fields (left to right) on the scantron form (use pencil):

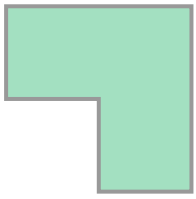
1. LAST NAME (surname) and FIRST NAME (given name), fill in bubbles
2. IDENTIFICATION NUMBER is your Campus ID number, fill in bubbles
3. Under A of SPECIAL CODES, write your lecture number, fill in bubbles. 1=8:50am, 2=11am
4. Under B of SPECIAL CODES, tell us about the nearest person (if any) to your left. 0=no person to the left in your row, 1=somebody you do not know is there, 2=somebody you do know is there.
5. Under C of SPECIAL CODES, do the same as B, but for the person to your right
6. **Under D of SPECIAL CODES, write 4 and fill in bubble 4**. This is very important!

Make sure you fill all the special codes above accurately in order to get graded.
You have 40 minutes to take the exam. Use a #2 pencil to mark all answers. When you're done, please hand in these sheets in addition to your filled-in scantron. You may not sit adjacent to your friends or other people you know in the class (having only one empty seat is considered "adjacent"). You may only reference your notesheet. You may not use books, your neighbors, calculators, or other electronic devices on this exam. Please place your student ID face up on your desk. Turn off and put away portable electronics now.

(Blank Page for You to Do Scratch Work)

Q1. What could be added to the following code to produce the below shape?

```
from shapely.geometry import box, Point
x = box(0, 0, 2, 2)
y = box(1, 1, 3, 3)
```



(A) `x.union(y)` (B) `x.intersection(y)` (C) `x.difference(y)` (D) `y.difference(x)`

Q2. After `result = re.findall(????, ????)`, what is the type of `result`?

(A) always a string (B) always a tuple (C) always a list (D) could be either a list or tuple

Q3. If a Flask app has the following handlers, what does it print when a user visits the home page in a browser?

```
@app.route("/")
def home():
    print("X")
    return '<html><body><img src="f"></body></html>'
@app.route("/plot.png")
def f():
    print("Y")
    return "TODO"
@app.route("/out.svg")
def handler2():
    print("Z")
    return "TODO"
```

(A) X only (B) X and Y (C) X and Z (D) X, Y, and Z

Q4. You're worried version B of your A/B test might be terrible but still want to evaluate it. What should you do? Choose the best answer.

(A) do an A/A test
(B) do a B/A test after switching to B
(C) choose a lower significance threshold
(D) start with 0% of B, then slowly increase

Q5. You have a DataFrame with numeric features and a categorical label. The label column has some missing values, and you want to guess what values should go there. What kind of problem is this?

(A) regression (B) classification (C) clustering (D) decomposition

Q6. Does the regular expression `r"[A-Z].+a"` match anything in the string `"1cbBd.a"`?

(A) yes (B) no

Q7. Does the following create a binary tree?

```
A.left = B
A.right = C
B.right = D
C.left = D
```

(A) yes (B) no

Q8. "Retry-After" is most often specified in the headers of a response with which status code?

(A) 100 (B) 200 (C) 404 (D) 429 (E) 500

Q9. What does an operating system do?

(A) manage resources
(B) garbage collect unused objects
(C) translate Python code to machine code
(D) translate Java code to Python code

Q10. How do you stage files for a git commit?

(A) `git add` (B) `git branch` (C) `git clone` (D) `git prep`

Q11. A piece of code loops N times. Inside the loop, it calls an O(N) function for each iteration. What is the complexity class of this piece of code?

(A) O(N) (B) O(N+N) (C) O(2N) (D) O(N**2)

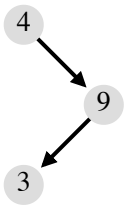
Q12. A polygon with alpha 1 is hidden beneath a triangle. If you want to see the polygon, what could you do?

(A) increase alpha of the polygon
(B) increase alpha of the triangle
(C) increase zorder of the polygon
(D) decrease zorder of the polygon
(E) increase zorder of the triangle

Q13. In the URL "http://PART1:PART2/PART3", what is PART2 for?

(A) indicating which VM (B) indicating which resource (C) indicating which process (D) query string

Q14. Is this a BST? (infer left/right child based on arrow direction)



(A) yes (B) no

Q15. What is *geocoding*?

(A) writing code that uses geopandas
(B) mapping an (x,y) to a point on the earth
(C) converting lat/lon to a meter-based CRS
(D) mapping a street address to a coordinate
(E) mapping a coordinate to a street address

Q16. 10 people visit a website. 2 of these click on an advertisement and 8 do not. What is the CTR?

(A) 1/5 (B) 1/4 (C) 4 (D) 5 (E) 0.8

Q17. If `obj` is of type `C`, what does `obj.method(x,y)` do?

(A) `C.method(x,y)`, (B) `C.method(obj)`, (C) `C.method(obj,x,y)` (D) `obj.method(obj,x,y)`

Q18. When is a stack frame created?

(A) when a function is defined
(B) when a function is called
(C) when a function returns

Q19. In the following code analyzing a contingency table from an A/B test, pvalue is 0.022. The threshold for significance is 2.0%. Do we have statistically significant evidence that B has a different click-through-rate than A?

```
from scipy import stats

df = pd.DataFrame({
    "click":    {"A": ????, "B": ????},
    "no-click": {"A": ????, "B": ????},
})
_, pvalue = stats.fisher_exact(df)
```

(A) yes (B) no

Q20. In shapely, what is the type of `Point(x,y).buffer(y)`?

(A) Point (B) Buffer (C) Circle (D) Oval (E) Polygon