

Exam 1 - Part B

Started: Mar 9 at 6:56pm

Quiz Instructions

The Quiz is Part B (the second of three parts) of Exam 1.

Once you begin this quiz, you will have 20 minutes to complete it. The 20 minutes begins when you start the quiz, so read the instructions before you start. These instructions are the same for all parts of the exam.

Be sure to complete **all** parts of the exam before 9:00pm (Madison time).

Please remember that during the exam window, you are not permitted to communicate with other students in class. Note: if someone breaks this rule (e.g., by sending a message or posting in a forum), it is your responsibility to ignore it (reading an illegal message is illegal).

Please remember that during the exam window, you are not permitted to discuss exam related topics with anyone other than course staff. While you are permitted to look things up on the web, you may not post questions related to the exam (except to Course Staff - send private messages on Piazza).

Before beginning this Quiz, check to see if any announcements have been made on Canvas. (you don't want to do this once the clock starts ticking when you begin the Quiz).

If you have a technical problem, try to resolve the issue yourself and proceed with the quiz as much as possible. Your 20 minutes do not pause once they start. As soon as possible, send a message to course staff. If you send a message (privately on Piazza), please provide as much detail as you can about your problem, and include your email address.

We will generally avoid making announcements during the exam. However, if there is something urgent, we will post it as a Canvas Announcement. We recommend checking the announcements before starting the Quiz. You may want to check announcements before hitting "submit" on the quiz as well (if you have time). If you check announcements, we recommend doing it in a different browser tab or window: if you leave the quiz, Canvas might lose information.

We will not answer questions about the exam content. If you think a question is ambiguous or has a typographical error, take your best guess at what you think we had in mind when writing the question.

The exam is "open book" - you may consult the course materials, your notes, or other resources. If something comes from another student, you must have gotten it from them before the exam window.

Many web resources are inappropriate for class - for example, they refer to different systems that work differently than what we discussed in class. There is also misinformation on the web. We are not responsible if you use an inappropriate source.

Many of the questions are "check all that are correct" questions with check boxes. You may check multiple boxes. Canvas grades these rather harshly: it is number correct minus number wrong (although, you can't score less than zero).

Tips and terminology:

For questions that force you to pick a single answer: if you think there is more than 1 correct answer, pick the one that is "most correct". In general, prefer things with the simplest explanation (as you are probably over-thinking things).

In this exam, all code fragments use the HTML Canvas 2D API. You can assume that the variable `context` refers to a valid HTML `CanvasRenderingContext2D` object.

Throughout the exam (like the course):

1. We measure rotations from the X axis towards the Y axis.
2. The default coordinate system in Canvas has origin at the top left, the X axis going to the right and the Y axis pointing down.
3. Canvas measures degrees in radians. The code fragments in the exam may use the helper function `degreesToRadians` that converts an angular measurement in degrees to radians.
4. Unless otherwise specified, transformation matrices apply to their arguments (points or vectors) as column vectors on the right.

Good luck!

Question 1

6 pts

The next few questions refer to this code fragment which is run in the web browser.

```
1 console.log("Start");
2 let a = 0;
3 function one() {
4     console.log("One, A is ",a);
5     a = 1;
6 }
7 function two() {
8     console.log("Two, A is ",a)
9     a = 2;
10    window.requestAnimationFrame(one);
11 }
12 function three() {
13     console.log("Three, A is", a);
14     window.requestAnimationFrame(two);
15     a = 3;
16 }
17 window.requestAnimationFrame(three);
18 a = 4;
19 console.log("End, A is ",a)
```

The number printed after "One, A is "

The number printed after "Two, A is "

The number printed after "Three, A is "

Question 2

3 pts

Which order are the lines printed in the program of the previous question? (these are the first words on the lines)

☐ One, Two, Three, End

☐ End, One, Two, Three

☒ End, Three, Two, One

☐ Three, Two, One, End

Question 3

4 pts

A Quadratic Bezier Curve has its control points at (0,0), (3,0), (0,3).

A Cubic Bezier Curve is connected to it, such that the beginning of the Cubic connects to the end of the Quadratic. The two curves meet with C(1) continuity.

What are the coordinates of its first two control points?

(,), (,)

Question 4**3 pts**

Three cubic Bezier segments are connected together to form a chain (not a loop) with G(1) continuity. What is the largest number of points that are not C(1)?

☐ 0 (zero)☐ 1☒ 2☐ 3☐ more than 3**Question 5****6 pts**

A Quadratic Bezier Curve has its control points at (0,0), (27,18) and (36,9)

If we cut the curve into two parts at $u=1/3$, what are the control points for the first (smaller) piece?

(,), (,
), (,)

Question 6**6 pts**

What does double buffering allow us to achieve?

- ☐ It forces us to draw everything twice
- ☐ It creates separate images for each eye (for stereo or VR)
- ☒ It allows us to show pictures only when we are done drawing them
- ☐ It enforces a constant frame rate
- ☐ It helps achieve a constant frame rate when drawing is fast (that is, it takes less time to draw than the desired frame rate)
- ☐ It allows images to flash twice to achieve flicker fusion

Question 7

8 pts

In the following program

```
context.save();
context.translate(10,0);
context.scale(2,2);
context.rotate(Math.PI/2);           // 90 degrees
context.translate(10,0);
context.moveTo(0,0);
context.restore();
context.rotate(Math.PI/2);           // 90 degrees
context.lineTo(10,0);
context.stroke();
```

The line segment starts at (the move to) is at ,

in the Canvas coordinate system.

The line segment ends at (the line to) is at ,

in the Canvas coordinate system.

Question 8**4 pts**

In SVG, you can set (or change) the color of a rectangle by...

(check all correct answers)

- ☐ Setting its attributes when the object is created
- ☐ Using a CSS style sheet on the web page that the SVG is part of
- ☐ Changing its attributes after the object is already visible
- ☒ Changing the attribute of a group containing the object after the object has been placed in the group

Question 9**4 pts**

The 2D point (3,2) is transformed by the homogeneous transformation matrix

$$\begin{bmatrix} 3 & 0 & 1 \\ 3 & 3 & 1 \\ 0 & 0 & 1 \end{bmatrix}$$

The resulting point is ,

Quiz saved at 9:15am

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