# Math 120 A - Spring 2024
# Midterm Exam Number Two
# May 16th, 2024

Name: _____ Student ID no. : _____

Signature: _____ Section: _____

| | | |
|---|---|---|
| 1 | 15 | |
| 2 | 15 | |
| 3 | 14 | |
| 4 | 8 | |
| 5 | 8 | |
| Total | 60 | |

*This grid is purely decorative.*
*The exam is graded online.*

- This exam consists of **FIVE** problems on **FOUR** double-sided pages. The fourth page is left blank for scratch work.
- Show all work for full credit.
- You may use a TI-30X IIS calculator during this exam. Other calculators and electronic devices are not permitted.
- You do not need to simplify your answers.
- If you use a trial-and-error or guess-and-check method when a more rigorous method is available, you will not receive full credit.
- Draw a box around your final answer to each problem.
- **Do not write within 1 centimeter of the edge!** Your exam will be scanned for grading.
- If you run out of room, write on one of the scratch work pages **and indicate that you have done so**. If you still need more room, raise your hand and ask for an extra page.
- You may use one hand-written double-sided 8.5″ by 11″ page of notes.
- You have 50 minutes to complete the exam.

You may use this page for scratch-work.

**All work on this page will be ignored** unless you write & circle "see first page" below a problem.

1. **[15 points]** I have $1200 to build a rectangular enclosure.

   Three of the sides use regular fencing that costs $5 per foot, but one of the sides uses super fencing[1] that costs $10 per foot.

   What is the maximum possible area of this enclosure?

Area: _____ square feet

[1] Look, I know "super fencing" isn't a thing, I'm just running out of ideas here.

2. Suppose $f$ is a linear-to-linear rational function with the following properties:

   - $f(3) = -4$
   - $f(25) = 8$
   - The graph of $f$ has a horizontal asympote of $y = 5$.

   (a) **[12 points]** Find a formula for $f(x)$.

$f(x) =$ _____

   (b) **[3 points]** What is the domain of $f$?

Domain: _____

3. **[7 points per part]** Carmy's restaurant is growing exponentially in popularity.

   In the year 2020, there were 10 thousand customers.

   In the year 2024, there were 13.6 thousand customers.

   (a) Write a function $c(t)$ for the number of customers, in thousands, $t$ years after 2020.

   **Write your answer in standard exponential form.**

$c(t) =$ _____

   (b) When will there be 74 thousand customers? (Round to the nearest year.)

Year: _____

4. **[8 points]** Norris and Esau are running around a circular track with radius 15 m.

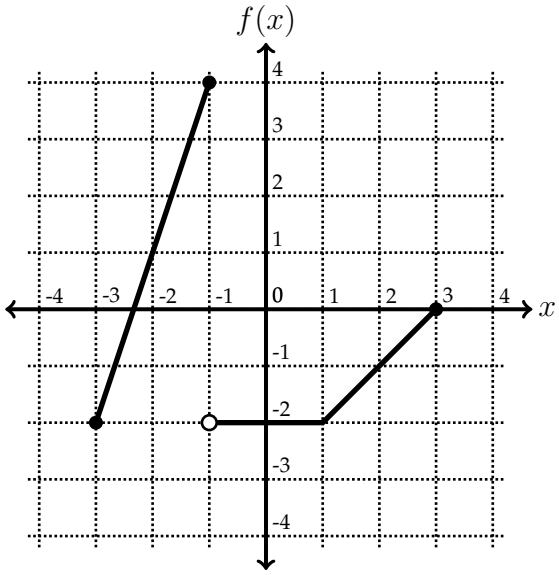
   Norris begins at the northernmost point and runs counterclockwise at a speed of 6 m/s.

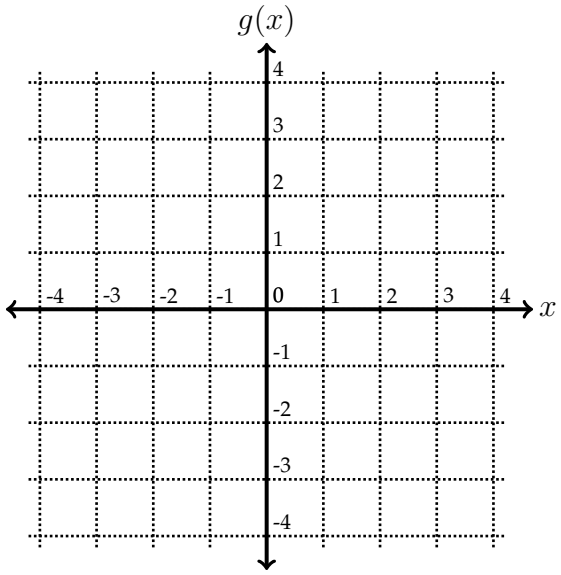
   Esau begins at the easternmost point and runs clockwise at constant speed. It takes him 20 seconds to run a full lap.

   When do they pass each other?

After _____ seconds

5. **[8 points]** On the left is the graph of $f(x)$. On the right, please graph $g(x) = -f(2x - 1)$.




If you need extra space, there are some spare grids on the back of the exam.

You may use this page for scratch-work.

**All work on this page will be ignored** unless you write & circle "see back page" below a problem.

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**All work on this page will be ignored** unless you write & circle "see back page" below a problem.

Here are some grids you can use for scratch work on problem #5.