Instructions:
1. Write your *Name, PID, Section Number,* and *Exam Version* on the *front* of your blue book.
2. You may use one $8.5x11$ in. sheet of *handwritten* notes, but no books or other assistance during this exam.
3. No calculator, phones, or any other electronic devices are allowed during this exam.
4. Present your solutions clearly in your Blue Book:
(a) Carefully indicate the number and letter of each question and each part of a question.
(b) Present your answers in the same order as they appear in the exam.
(c) Start each problem on a new page.
5. Show all of your work. Unsupported answers will receive no credit.
6. Turn in your exam paper and your note sheet with your Blue Book.

0. (1 point.) Carefully read and follow the instructions. *Suggestion: Read the entire exam first, and then start with the easier problems. Some of these problems are easier than the others.*

1. The radioactive isotope Fakium-210 has a half-life of 6 years. Suppose a sample of Fakium-210 has an initial mass of 30 grams.

    (a) (4 points) Let $P(t) = P_0 b^t$ be the function that tells us the amount of Fakium-210 that remains after t-years. Find P_0 and b. For full points show all work for how you find P_0 and b (i.e., don't just copy the half-life formula from the book).

    (b) (4 points) How many years does it take until only 5% of the original sample of Fakium-210 remains?

2. Solve for x in the following functions:

    (a) (4 points) $2 \log_x(2) + \log_x(9) = 2$

    (b) (4 points) $e^{2x} + e^x = 6$
    Hint: For part (a), use log rules to simplify the left side of the equation.

3. (a) (6 points) Find all solutions to the following system of linear equations
$$\begin{aligned} -x + 4y &= -4 \\ 2x + y &= 0 \end{aligned}$$

(b) (2 points) Is it possible for a system of two linear equations in two variables to have exactly 2 solutions? Explain.

4. (a) (2 points) Convert $540°$ to radians, and reduce as much as possible.

 (b) (2 points) Convert $\frac{11\pi}{12}$ radians to degrees, and reduce as much as possible.

5. (a) (5 points) Suppose $\sin(\theta) = \frac{2}{3}$, and $\cos(\theta) < 0$. What is the value of $\cos(\theta)$?

 (b) (3 points) Evaluate: $\cos\left(-\frac{5\pi}{6}\right)$, $\sin\left(-\frac{5\pi}{6}\right)$, and $\tan\left(-\frac{5\pi}{6}\right)$.