Answer all questions below. All questions are worth 1 point except where otherwise noted. No cell phones, calculators, or notes are allowed during the exam. If you are stuck on a problem, skip it and come back to it later.

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Write your answers to #1-24 on the answer sheet provided.

Planar Transformations

For #1-4 match each planar transformation with its geometric interpretation.

1. $\begin{pmatrix} \frac{1}{2} & 0 \\ 0 & 2 \end{pmatrix}$
2. $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$
3. $A_{(\frac{1}{2},2)}$
4. $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$

A.) Scale x-coordinate by $\frac{1}{2}$, y-coordinate by 2.
B.) Scale x-coordinate by 2, y-coordinate by $\frac{1}{2}$.
C.) Flip over x-axis.
D.) Flip over y-axis.
E.) Flip over $y = x$ line.
F.) Moves points right 2, up $\frac{1}{2}$.
G.) Moves points right $\frac{1}{2}$, up 2.
H.) Does nothing.

For #5-8, give the inverse of the planar transformation.

5. $A_{(\frac{1}{2},-1)}$
6. $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$
7. $\begin{pmatrix} \frac{2}{3} & 0 \\ 0 & 4 \end{pmatrix}$
8. $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$

Matrices and Vectors

For #9-16, find the resulting vector and write it as a row vector.

9. $(6, 7) + (-1, -2)$

10. $\begin{pmatrix} -1 \\ -2 \end{pmatrix} - \begin{pmatrix} -1 \\ 5 \end{pmatrix}$

11. $\pi(2, \frac{3}{\pi})$

12. $A_{(0,0)}(6, 7)$

13. $\begin{pmatrix} 2 & 3 \\ 1 & 4 \end{pmatrix} \begin{pmatrix} -1 \\ 3 \end{pmatrix}$

14. $\begin{pmatrix} -1 & 2 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} -1 \\ 3 \end{pmatrix}$

15. $\begin{pmatrix} 4 & 0 \\ 0 & -1 \end{pmatrix} \begin{pmatrix} -1 \\ 3 \end{pmatrix}$

16. $\begin{pmatrix} 5 & 6 \\ 7 & 8 \end{pmatrix} \begin{pmatrix} -1 \\ 3 \end{pmatrix}$

17. Find the product: $\begin{pmatrix} 3 & 4 \\ -1 & -2 \end{pmatrix} \begin{pmatrix} -1 & 2 \\ 4 & -3 \end{pmatrix}$

18. Compute the determinant: $\det \begin{pmatrix} 2 & -5 \\ \frac{5}{3} & \frac{1}{3} \end{pmatrix}$

19. (2 points) Find the inverse of $\begin{pmatrix} 3 & 4 \\ -2 & 1 \end{pmatrix}$.

Equations in One Variable

Find the implied domain of the following equations.

20. $\log_{10}(x^2 + 2) = 1 - x^2$

21. $x^2 + 4x + \sqrt{x} = \frac{x}{x-6}$

22. $\sqrt{15x - 3} = x^2 + 2$

23. $\log_e(x^2) + 5 = x^5 + 4x + 1$

24. $e^{\sqrt{x}} = 0$

The remaining questions are worth 2 points. Solve the equations in the space provided below each question.

25. $e^{2x} + 2e^x - 3 = 0$

26. $(x^2 + 2x + 1)^2 = 4$

27. $\log_3(1-x^2)^2 = 1$

28. $e^{x^2-5} = -3$

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1. _____ 12. _____

2. _____ 13. _____

3. _____ 14. _____

4. _____ 15. _____

5. _____

17. _____

6. _____ 18. _____

7. _____ 19. _____

20. _____

8. _____ 21. _____

9. _____ 22. _____

10. _____ 23. _____

11. _____ 24. _____