Math 1050–4 Final Exam (practice) #3

April 17, 2015

- No notes, books, etc. are allowed.
- Answer the questions in the spaces provided.
- You have 2 hours to complete this exam.
- **Good luck!**

Name: _____ uNID: _____

Page	Points	Score
2	6	
3	6	
4	7	
5	9	
6	5	
7	7	
8	8	
9	3	
10	12	
11	12	
12	6	
13	4	
14	4	
Total:	89	

Points earned: _____
out of a possible 0 points

1. (1 point) Find $\sum_{i=1}^{4}(i^2 - 1)$

1. _____

2. (1 point) Find $\sum_{i=1}^{\infty} \frac{2}{6^i}$

2. _____

3. (1 point) What is the 61-st term of the sequence $7, 11, 15, 19, \ldots$?

3. _____

4. (1 point) What is the 57-th term of $-3, 6, -12, 24, \ldots$?

4. _____

5. (2 points) What is the sum of the first 60 terms of the sequence $3, 5, 7, 9, \ldots$?

5. _____

Points earned: _____
out of a possible 6 points

6. (1 point) Suppose a set A contains 243 objects. How many 92 object subsets of A are there?

6. _____

7. (1 point) How many ways are there to choose and order 49 objects from a collection of 304 objects?

7. _____

8. (1 point) How many different ways are there to order 93 different objects?

8. _____

9. (1 point) You're decorating a room by choosing a color of paint for the walls, and a color of carpet. You have 6 different colors of paint to choose from, and 11 different colors of carpet to choose from. How many different wall and floor color combinations could you create?

9. _____

10. (2 points) Write $\binom{9}{3}$ as an integer in standard form.

10. _____

Points earned: _____
out of a possible 6 points

For #11–#15, write the given number as a rational number in standard form

11. (1 point) $\left(\frac{27}{8}\right)^{-\frac{2}{3}}$

11. _____

12. (1 point) a^0 (assume that $a \neq 0$) (*Hint:* This is related to the graph of a^x.)

12. _____

13. (1 point) $\log_a(1)$ (assume that $a > 0$ and $a \neq 1$) (*Hint:* This is related to the graph of $\log_a(x)$.)

13. _____

14. (2 points) $7^{-4}\sqrt[2]{7^9}\left(7^{\frac{1}{2}}\right)^3$

14. _____

15. (2 points) $\log_3\left(\sqrt[5]{\frac{1}{81}}\right)$

15. _____

Points earned: _____
out of a possible 7 points

16. (1 point) Find $g \circ f(x)$ if $f(x) = x + 2$ and $g(x) = x^2$

16. _____

17. (2 points) Find x where $x^3 \left(\frac{1}{2}x + 3\right)^3 = 8$

17. _____

18. (2 points) Find x where $2\left(\frac{e^{2x}}{e^{x+3}}\right) + 5 = 7$

18. _____

19. (2 points) Find x where $4\log_e(x) + \log_e(x^3) + 8 = 11$

19. _____

20. (2 points) Find the inverse of $g(x) = 7\log_e(x + 3)$

20. _____

Points earned: _____
out of a possible 9 points

21. (1 point) What is the implied domain of $g(x) = \dfrac{x^3}{2} - 7\sqrt[3]{x-4}$?

21. _____

22. (2 points) What is the implied domain of $f(x) = x^2 - 2x + \log_e(3 - 7x)$?

22. _____

23. (2 points) Find $\dfrac{x^3 - 3x^2 - 5x + 14}{x^2 - 4}$

23. _____

Points earned: _____
out of a possible 5 points

24. (1 point) Find a root of $x^3 + 2x^2 - x + 6$

24. _____

25. (2 points) How many roots does $2x^2 - 3x + 4$ have?

25. _____

26. (2 points) Completely factor $-2x^3 + 2x + 12$. (*Hint:* 2 is a root.)

26. _____

27. (2 points) Complete the square: Write $-2x^2 - 4x - 5$ in the form $\alpha(x+\beta)^2 + \gamma$ where $\alpha, \beta, \gamma \in \mathbb{R}$.

27. _____

Points earned: _____
out of a possible 7 points

28. (1 point) $|x - y|$ is the distance between which two numbers?

28. _____

29. (2 points) Solve for x if $|3x - 2| < 4$

29. _____

30. (1 point) What is the determinant of the matrix below?

$$\begin{pmatrix} 2 & -3 \\ 1 & -5 \end{pmatrix}$$

30. _____

31. (2 points) Find the product

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

31. _____

32. (2 points) What is the inverse of the matrix below?

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

32. _____

Points earned: _____
out of a possible 8 points

33. (1 point) Write the following system of three linear equations in three variables as a matrix equation

$$\begin{aligned} 2x - y + z &= 2 \\ y + 2z &= 1 \\ -x + y - z &= 0 \end{aligned}$$

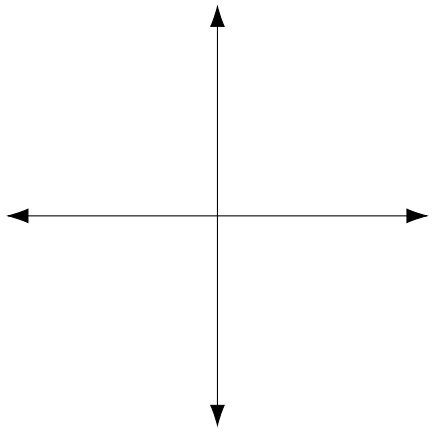
34. (2 points) Solve for x, y, and z if

$$\begin{pmatrix} -1 & 2 & -1 \\ -2 & 2 & -1 \\ 3 & -1 & 1 \end{pmatrix}\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} -2 \\ 2 \\ 1 \end{pmatrix} \text{ and } \begin{pmatrix} -1 & 2 & -1 \\ -2 & 2 & -1 \\ 3 & -1 & 1 \end{pmatrix}^{-1} = \begin{pmatrix} 1 & -1 & 0 \\ -1 & 2 & 1 \\ -4 & 5 & 2 \end{pmatrix}$$

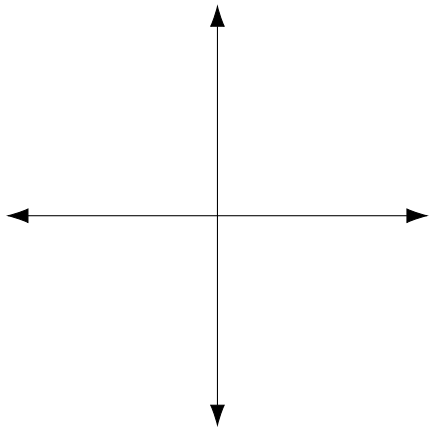
Points earned: _____
out of a possible 3 points

For #35–#40, mark and label x- and y-intercepts (if there are any).

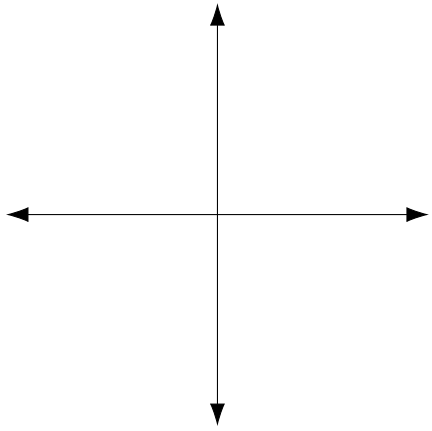
35. (2 points) 3



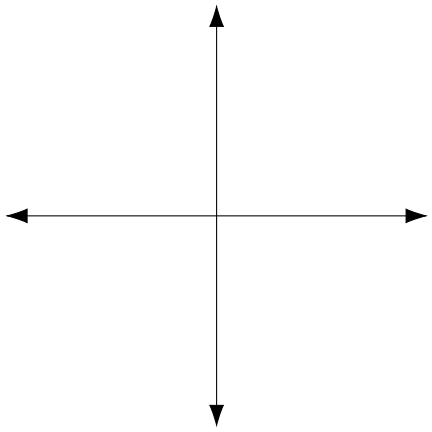
36. (2 points) x



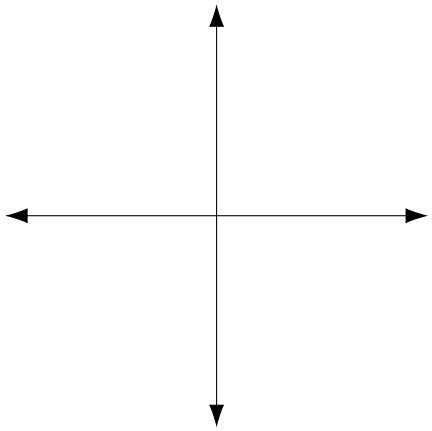
37. (2 points) x^2



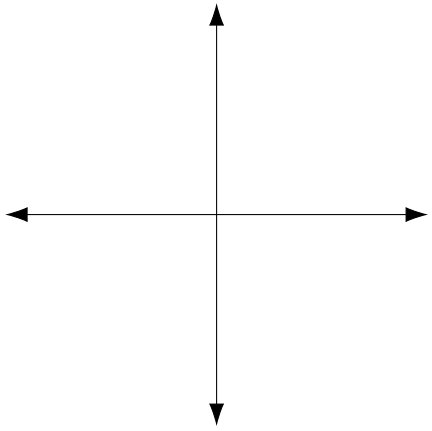
38. (2 points) x^3



39. (2 points) $\sqrt[2]{x}$



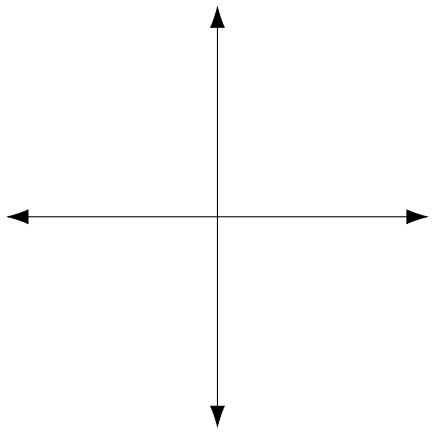
40. (2 points) $\sqrt[3]{x}$



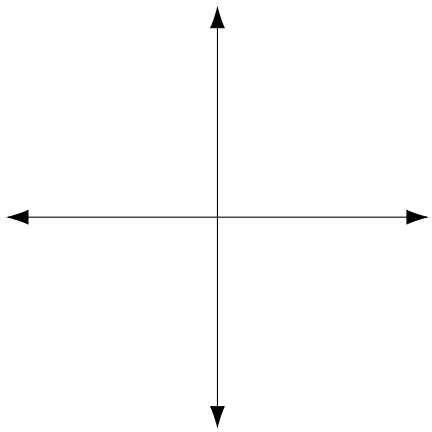
Points earned: _____
out of a possible 12 points

For #41–#46, mark and label x- and y-intercepts (if there are any).

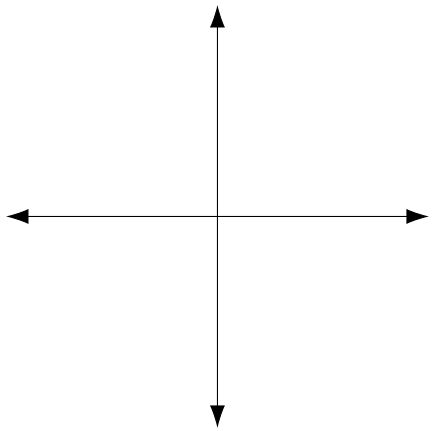
41. (2 points) $\dfrac{1}{x}$



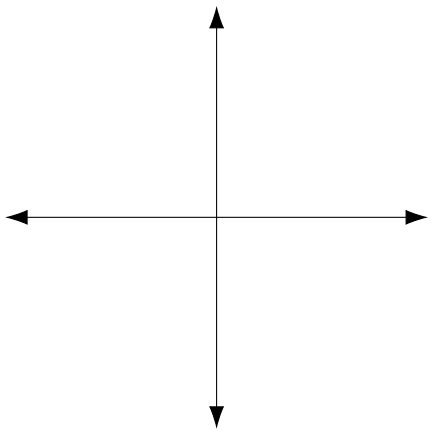
42. (2 points) $\dfrac{1}{x^2}$



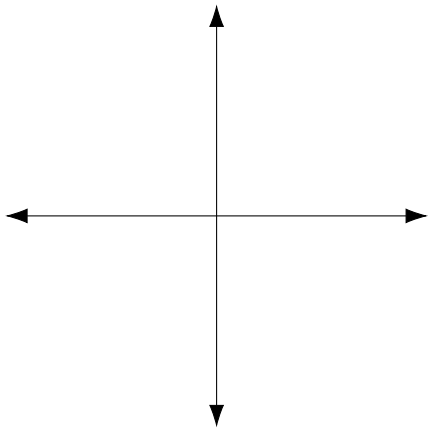
43. (2 points) e^x



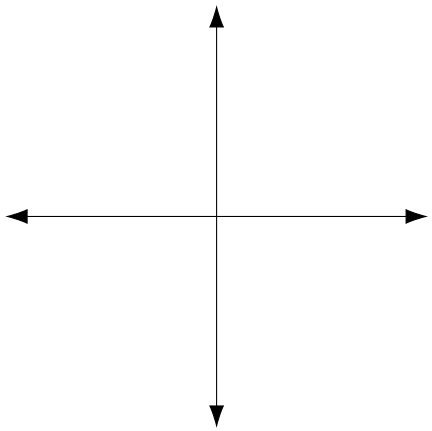
44. (2 points) $\log_e(x)$



45. (2 points) $-2e^{-x}$

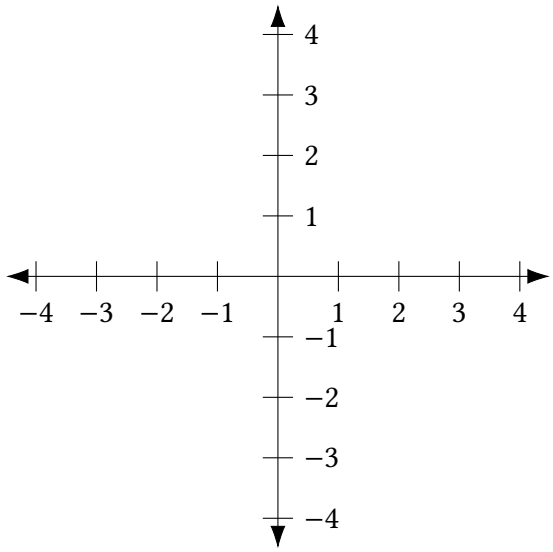


46. (2 points) $-3\sqrt[3]{x+2}$

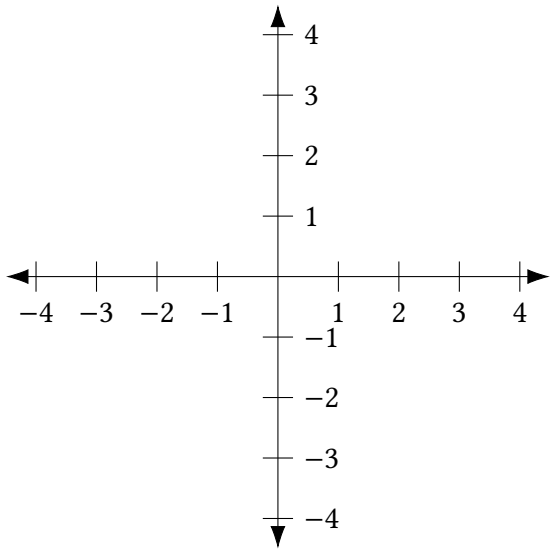


Points earned: _____
out of a possible 12 points

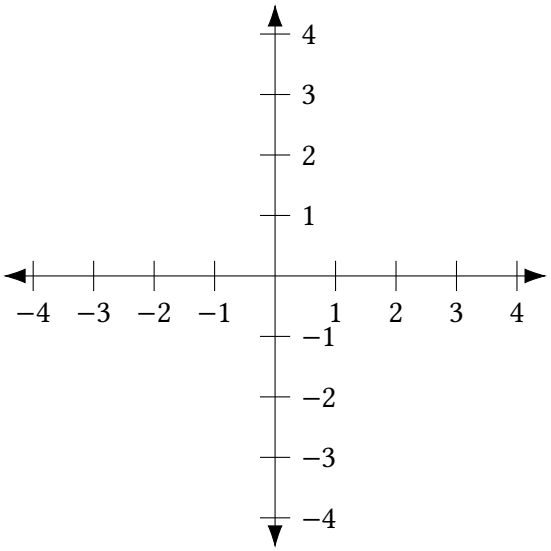
47. (2 points) $f : (-2, 0] \to \mathbb{R}$
where $f(x) = x^2$



48. (2 points) $g : \{-4, -2, 2\} \to \mathbb{R}$
where $g(x) = \frac{1}{2}x - 1$



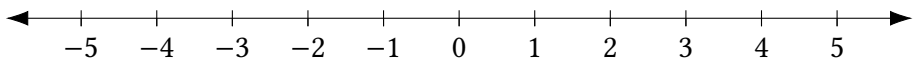
49. (2 points) $4(x + 2)^2 + 1$



Points earned: _____
out of a possible 6 points

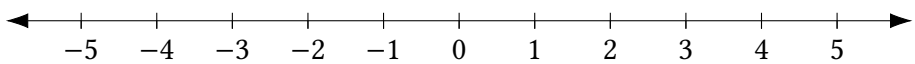
50. (2 points) Graph $p(x)$ and label all x-intercepts:

$$p(x) = -2(x+1)(x+1)(x-2)(x^2+1)$$



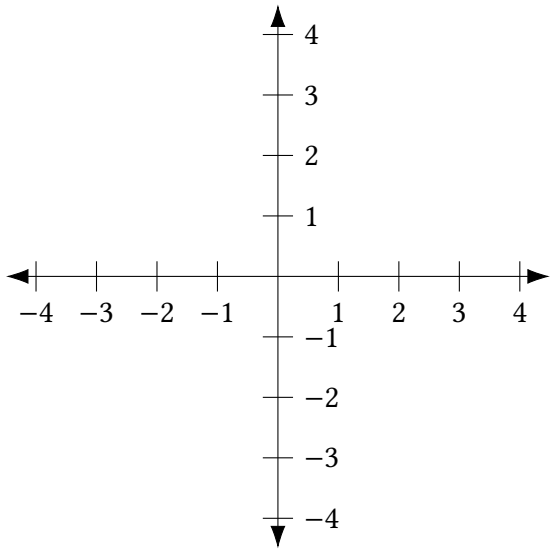
51. (2 points) Graph $r(x)$, and label all x-intercepts and all vertical asymptotes:

$$r(x) = \frac{-3(x-1)(x-1)}{4(x+2)(x^2+1)}$$

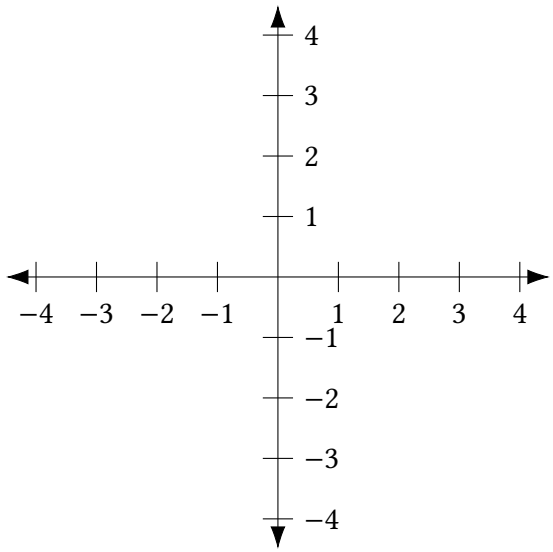


Points earned: _____
out of a possible 4 points

52. (2 points) $h(x) = \begin{cases} e^x & \text{if } x \neq 1 \\ -3 & \text{if } x = 1 \end{cases}$



53. (2 points) $m(x) = \begin{cases} 1 & \text{if } x \in (-\infty, 1) \\ 3 & \text{if } x = 1 \\ x^2 & \text{if } x \in (1, 2] \end{cases}$



Points earned: _____
out of a possible 4 points