MAT 100: Exam 1 **Name:** _____
Fall – 2022
10/07/2022
85 Minutes

Write your name on the appropriate line on the exam cover sheet. This exam contains 16 pages (including this cover page) and 15 questions. Check that you have every page of the exam. Answer the questions in the spaces provided on the question sheets. Be sure to answer every part of each question and show all your work.

Question	Points	Score
1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
8	10	
9	10	
10	10	
11	10	
12	10	
13	10	
14	10	
15	10	
Total:	150	

1. (10 points) Showing all your work and finding an exact answer, compute the following:

   (a) $3(2^4) - 12$

   (b) $\dfrac{(-2)^3 - 5 + 3 \cdot 6}{-5}$

   (c) $\dfrac{5 \cdot 4 - 4 \cdot 3}{5 - 1}$

2. (10 points) Define the following sets:

$$A = \{-3,\ 1,\ 2,\ 3,\ 5,\ 10,\ 20,\ 30,\ 40,\ 50\}$$
$$B = \{-3,\ 3,\ 10,\ 50\}$$
$$C = \{2,\ 5,\ 20,\ 40,\ 50\}$$
$$D = \{-3,\ 1,\ 5\}$$
$$E = \{1,\ 2,\ 3,\ 5\}$$

Consider all these sets as subsets of A. Compute the following:

(a) D^c

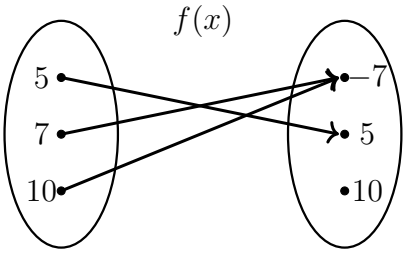
(b) $C \cup D$

(c) $B \setminus C$

(d) $D \cap E$

(e) $|E|$

3. (10 points) Determine whether the relation below is a function of not. Be sure to fully justify your response. If the relation is a function, find its domain, codomain, and range.



4. (10 points) Explain why $f(x, y) = x^2 - y + 1$ is a function. Then showing all your work, find $f(0, 0)$, $f(0, -4)$, $f(3, 6)$, and $f(-2, 10)$.

5. (10 points) Showing all your work, find the following:

   (a) 56% of 920

   (b) 150% of 60

   (c) 1% of 840

6. (10 points) Showing all your work, compute the following:

   (a) 150 increased by 42%

   (b) 245 decreased by 20%

   (c) 660 increased by 125%

7. (10 points) Find the average value of the following numbers: $-7, -4.2, -1, 0, 2, 6, 10, 12$.

8. (10 points) Suppose a student's course grade consists of the following weights:

Homework	40%	Exam 2	15%
Quizzes	5%	Final Exam	17%
Exam 1	8%	Project	15%

Suppose also that a student had a 85.6% homework average, 80% quiz average, 92% on exam 1, 87% on exam 2, 79% on the final, and 95% on the project. Compute the student's course average to the nearest tenth of a percent.

9. (10 points) Suppose you take the courses shown below and receive the given letter grades. Showing all your work, compute your GPA to the nearest thousandth. The university's letter grade system is shown on the right below.

Course	Credits	Letter Grade
Eastern Europe	3	B−
Modern American Literature	3	C+
Calculus II	4	A
Chemistry I	4	A−
Introduction to College Life	1	A
Freshman Seminar	3	B

A	4.0	C+	2.3
A–	3.7	C	2.0
B+	3.3	C–	1.7
B	3.0	D	1.0
B–	2.7	F	0.0

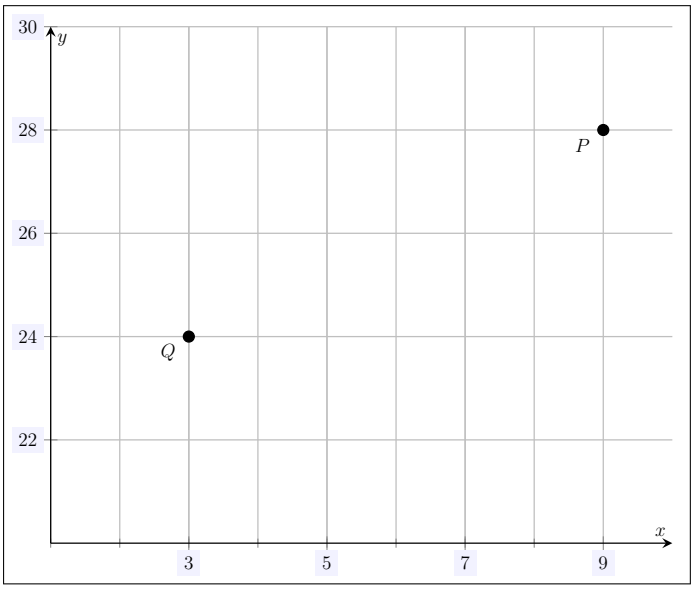
10. (10 points) Showing all your work, convert 648 in^2 to square feet. Recall that there are twelve inches in every foot.

11. (10 points) Showing all your work, convert 9.5 km/hr to feet per minute. Note that 1 m is 3.28084 ft.

12. (10 points) Suppose you are covering a wall with black and white checker tiles. The wall measures 40 ft across and is 9 ft tall. If each tile is 6 in by 6 in, how many tiles will you need to cover the wall? Suppose also that you can put tiles on the wall at a rate of 3 tiles per minute. How long will it take you to tile the wall? For both questions, be sure to show all your work and fully justify your answer.

13. (10 points) Showing all your work, find the volume of a cylinder that is measures 4 in across the bottom and is 11 in tall.

14. A city is laid out in a grid structure with street corners meeting at right angles, as shown below with the street labeled. Suppose you are standing at point P and your friend is standing at point Q.



(a) (4 points) How many blocks are you from your friend 'as the crow flies'?

(b) (4 points) How many blocks are you from your friend using the taxicab metric?

(c) (2 points) Supposing you can walk a block in 4 min and given your answer in (b), how long do you estimate that it will take you to walk to your friend?

15. (10 points) Showing all your work and fully explaining your approximation, estimate how many pet dogs there are in the United States.