MAT 101: Exam 2 **Name:** _____
Winter – 2021
01/14/2021
95 Minutes

Write your name on the appropriate line on the exam cover sheet. This exam contains 18 pages (including this cover page) and 17 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	6	
2	6	
3	4	
4	6	
5	6	
6	6	
7	6	
8	6	
9	6	
10	4	
11	6	
12	6	
13	6	
14	6	
15	6	
16	4	
17	10	
Total:	100	

1. (6 points) A table of values for a function $f(x)$ is given below.

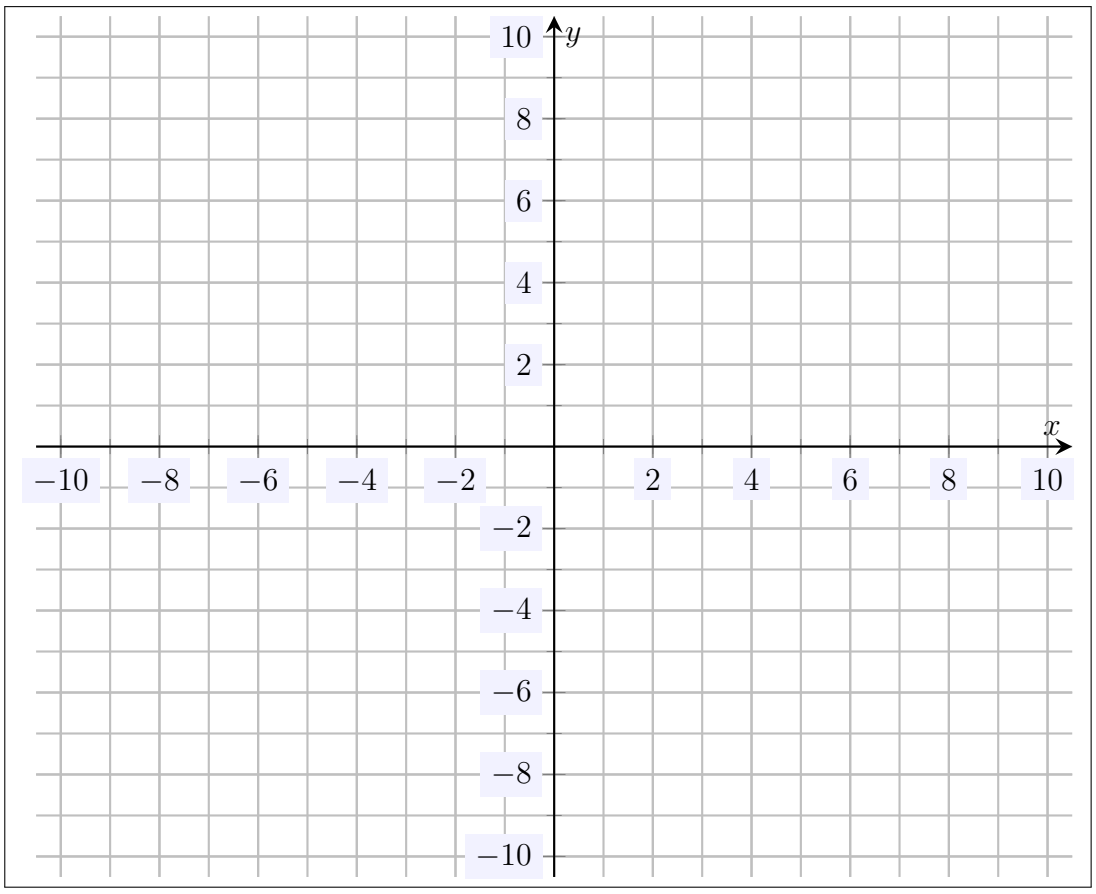
x	-5	-4	-3	-2	-1	0	1	2	3	4	5
$f(x)$	6	3	0	-2	4	6	3	0	5	6	8

Determine the y-intercepts and x-intercepts for the function $f(x)$.

2. (6 points) A table of values for a function $f(x)$ is given below. Determine whether the function $f(x)$ is linear or not. Be sure to fully justify your answer.

x	0	1	2	4	5	6
$f(x)$	-5	-2	1	7	11	13

3. (4 points) Sketch the line $3x - 5y = 10$ on the plot below.



4. (6 points) Two lines are given below. Determine whether these lines are the same or parallel. Determine also whether these lines intersect or not. If so, determine whether they intersect perpendicularly.

$$\begin{aligned} \ell_1: &\quad y = 8 - \frac{5}{6}x \\ \ell_2: &\quad 6x + 5y = 15 \end{aligned}$$

5. (6 points) A table of values for a linear function $f(x)$ is given below.

x	-12	-8	-4	4	8	12
$f(x)$	21	18	15	9	6	3

Determine the equation for $f(x)$.

6. (6 points) Find the equation of the line that contains the points $(-10, 15)$ and $(2, -1)$.

7. (6 points) Determine the equation of the line that contains the point $(6, 10)$ and is perpendicular to the line $y = -1$.

8. (6 points) Find the equation of the line that is perpendicular to the line $y = 4 - 5x$ and passes through the y-intercept of the line $y = 2x + 3$.

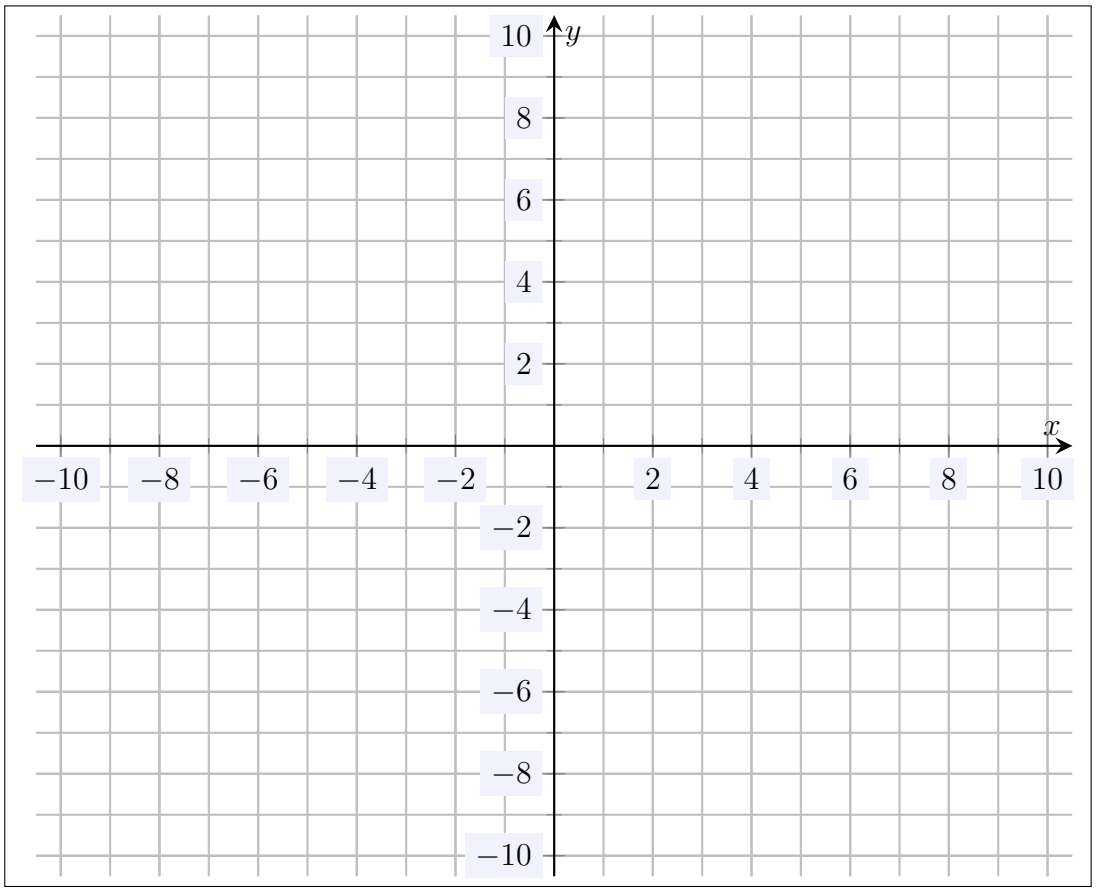
9. (6 points) A researcher creates a model to predict adolescent male's weight (in lbs) from their height (in cm). The model is $W(h) = 2.6h - 17.3$.

   (a) Is the model linear? Explain.

   (b) Determine the slope of $W(h)$. Interpret the slope in context.

   (c) Determine the y-intercept of $W(h)$. Does the y-intercept have meaning in this context? Explain.

10. (4 points) Sketch the function $f(x) = 8 - (x+3)^2$ on the plot below.



11. (6 points) Showing all your work, find the vertex form of $y = 2x^2 - 12x + 23$.

12. (6 points) Showing all your work, factor the polynomial $x^2 - 22x - 48$.

13. (6 points) Showing all your work, factor the polynomial $5x^2 + 19x - 4$.

14. (6 points) Showing all your work, solve the equation $2x = 24 - x^2$.

15. (6 points) Showing all your work, use the quadratic equation to solve $2x^2 = 4x - 10$.

16. (4 points) Consider the quadratic function $f(x) = x^2 - 6x + 4$. Use the discriminant of $f(x)$ to show that $f(x)$ does not factor 'nicely', then use the quadratic formula to factor $f(x)$.

17. (10 points) Consider the function $f(x) = 3x^2 - 15x + 20$.

    (a) Determine if the parabola is concave up or concave down.

    (b) Determine the axis of symmetry of $f(x)$.

    (c) Determine the vertex of $f(x)$.

    (d) Does $f(x)$ have a maximum or minimum value? Explain.

    (e) Find the maximum or minimum value of $f(x)$ from (d).