**Name:**
Recitation Instructor:
Recitation Day and Time:

Studio College Algebra – FINAL EXAM – Fall 2021

Directions: You will find 24 problems listed below. The problems are worth 5 points. No notes/books/friends are allowed. Graphing calculator models above the level of a TI-84 plus are not allowed (in particular, calculators with a built in CAS and/or QWERTY keyboard are not allowed). You have one hour and fifty minutes to complete this exam.

1. Solve for x in the equation $-3(4x - 1) + 2 = 7x - 5$.

2. Graph $3x + y = 2$ on the grid below. Include all intercepts.
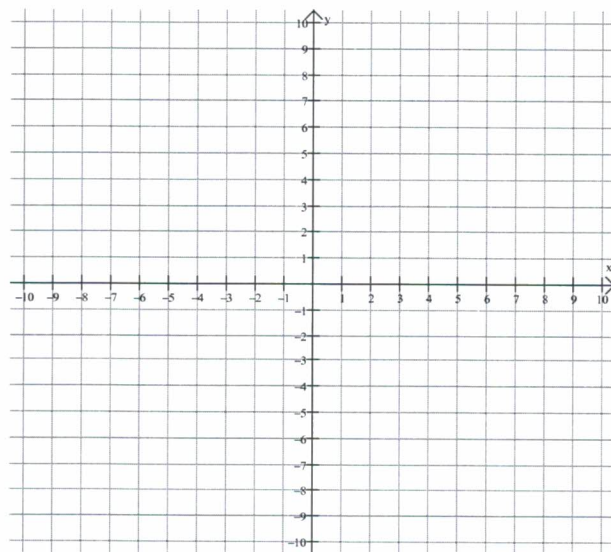
3. (5 points) What is the domain of the function $f(x) = \sqrt{5-x}$?

4. (5 points) What is the domain of the function $f(x) = \dfrac{3}{4x-28}$?

5. The equation $5F - 9C = 160$ gives the relationship between Fahrenheit and Celsius temperature measurements, where F is the temperature in Fahrenheit and C is the temperature in Celsius. What Celsius measure corresponds to a Fahrenheit measure of 35 degrees? Round your answer to the nearest tenth.

6. Consider $g(x) = \dfrac{4 - x}{5}$. Answer the following:

   (a) Find $g(-3)$.

   (b) Find $g(-1)$.

   (c) Find $g(0)$.

   (d) Find $g(2)$.

   (e) Find $g(4)$.

7. A parabola has vertex at $(4, -6)$ and passes through the point $(-2, 3)$. What is the equation of the parabola? Write your answer in the form $y = a(x - h)^2 + k$ (DO NOT MULTIPLY OUT).

8. Given $h(x) = 2x + 1$ and $k(x) = 3x^2 - 7x$, find $k(h(x))$ and expand completely.

9. Given $r(x) = x + 2$ and $m(x) = 2x^3 - 3x$, find $r(x)m(x)$.

10. Solve the quadratic equation $16x^2 - 10 = 15$.

11. Given $f(x) = 5x + 4$, find $f^{-1}(x)$.

12. A student claims that linear functions are always one-to-one functions. Evaluate the accuracy of this statement, using complete sentences. The more correct details you include, the better!

13. If $\log(a) = 9$ and $\log(b) = 7$, find $\log(ab^2)$.

14. Approximately what lump sum would need to be invested at an annual interest rate of 1%, under continuous compounding, for 4 years, in order to end up with \$6000? Round answer to the nearest cent. The formula you want to use is $P(t) = P_0e^{rt}$.

15. Solve $2^{(x+1)} = 11$. Leave answer exact, i.e., do not use calculator.

16. Solve $5\ln(x + 5) - 12 = 8$. Leave answer exact, i.e., do not use calculator.

17. State the degree, leading coefficient, constant term, and leading term of $p(x) = 4x^5 - 7x^2 + 6x + 12$ (you should have 4 items listed in your answer.)

18. Explain the end behavior of $f(x) = 36x + x^3$, and make sure you include reasons in your explanation.

19. Given that $x = 2$ is a zero of the polynomial $p(x) = 2x^3 - 12x^2 + 74x - 116$, find all the other zeros, real or complex, of $p(x)$.

20. Consider the rational function $r(x) = \dfrac{2 - x}{x^2 - 9x + 18}$.

(a) Find the poles (vertical asymptotes) of $r(x)$.

(b) Find the zeros of $r(x)$.

(c) Find the y-intercept of $r(x)$.

21. In lecture we learned about a formula to find the inverse of a 2×2 matrix. Given A below, write down the formula for A^{-1}.

$$A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$$

22. Find the inverse of the matrix given below:

$$\begin{pmatrix} 1 & 3 \\ -9 & 2 \end{pmatrix}$$

23. Set up and solve a system of equations using 2 variables: cashews cost $10.00 per pound, while almonds cost $12.00 per pound. How much of each type is needed to create 8 pounds of a mixture that costs $10.25 per pound?

24. If matrix A is a 3x3 matrix, and matrix B is a 2x3 matrix, which of the following products exist? Explain how you know you are correct.

(a) AB

(b) BA

(c) B^2 (So B multiplied by itself)

(d) A^2 (So A multiplied by itself)