Math 195 Final Exam

You have 2hr 15min. Answer each non-graph question neatly on the line provided.

Name: _____ ID: _____

1. (4 points) Simplify $\left(\frac{2a^{-1}b}{a^4b^{-2}}\right)^3$ and eliminate negative exponents.

1. _____

2. (4 points) Simplify $64^{-\frac{1}{2}}$ completely.

2. _____

3. (4 points) Factor $2x^2 + 4x - 96$ completely.

3. _____

4. (4 points) Sketch the graph of $f(x) = -2^{x+1} + 3$. Label all asymptotes on your graph for full credit.

5. (4 points) Perform the addition $\frac{4}{x^2} + \frac{9}{x^2+6}$ and simplify as one reduced fraction.

5. _____

6. (4 points) Perform the multiplication $\frac{4x^2}{x^2-81} \cdot \frac{2x+18}{16x}$ and simplify as one reduced fraction.

6. _____

7. (4 points) Find all solutions x to $\frac{2}{x+2} - \frac{4}{x^2} = 0$.

7. _____

8. (4 points) Sketch the graph of the piecewise function $\text{f(x)} = \begin{cases} 2x & \text{if } x < -1 \\ 5 - x^2 & \text{if } x \geq -1 \end{cases}$

9. (4 points) Find the radius of the circle with equation $x^2 + y^2 - \frac{1}{2}x + \frac{1}{2}y = \frac{1}{8}$.

9. _____

10. (4 points) Find an equation of the line that passes through the points $(-1, -2)$ and $(7, -6)$.

10. _____

11. (4 points) Evaluate $\sin\left(-\frac{5\pi}{12}\right)$.

11. _____

12. (4 points) Sketch the graph of $y = 2 - |x + 10|$.

13. (4 points) Solve $x(2x+9) \geq 0$ for x. Express the solution using interval notation.

13. _____

14. (4 points)

FIND $\cos(t)$ IF $\sin(t) = \frac{3}{5}$ AND $\tan(t) < 0$.

14. _____

15. (4 points) Find the average rate of change of $f(t) = t - \frac{2}{t}$ between $t = \frac{-1}{4}$ and $t = \frac{1}{2}$.

15. _____

16. (4 points) SKETCH THE GRAPH OF ONE COMPLETE PERIOD OF THE FUNCTION $y = -3\sin\left(\frac{1}{4}x\right)$.
LABEL ALL INTERCEPTS, MAXIMUMS, AND MINIMUMS.

17. (4 points) Find the inverse function of $f(x) = \frac{1}{x+9}$.

17. _____

18. (4 points) Evaluate and simplify $f(10+h) - f(10)$ when $f(x) = -2x^2 + x + 5$.

18. _____

19. (4 points) Use the table

x	1	2	3	4	5	6
$f(x)$	2	3	5	1	6	3
$g(x)$	3	4	1	5	2	6

to evaluate $g(f(g^{-1}(2)))$

19. _____

20. (4 points) In 2010 the deer population in a Pennsylvania county was $20,000$. In 2014 the deer population in the county had grown to $31,000$. Assuming the deer population in the county is growing exponentially, approximate the county's deer population in 2023. (You may leave log or e in your answer.)

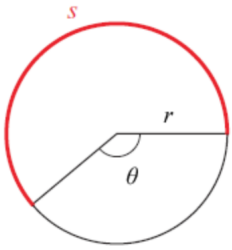
20. _____

21. (4 points) Evaluate $\log_{36}(\frac{1}{6})$.

21. _____

22. (4 points) Solve $2\log x = \log 2 + \log(4x - 6)$ for x.

22. _____



23. (4 points) Find the length s of the circular arc when $r = 8$ and $\theta = 120°$.

23. _____

24. (4 points) A 22-ft ladder leans against a building so that the angle between the ground and the ladder is 30°. How high does the ladder reach on the building?

24. _____

25. (4 points) Evaluate $\sin^{-1}\left(\cos\left(\frac{7\pi}{6}\right)\right)$.

25. _____