IUPUI Department of Mathematical Sciences
Departmental Final Examination

PRACTICE FINAL EXAM VERSION #2

MATH 15900

Precalculus

Exam directions similar to those on the departmental final.

1. **DO NOT OPEN** this test booklet until you are told to do so.
2. This is NOT the exam for MATH 15300 or 15400.
3. There are 7 pages in this exam with problems 1 to 23 and a bonus problem.
4. You MUST get a new exam from the proctor if your exam is incomplete.
5. PRINT your name and student ID# below.
6. MARK your section below.
7. You will have two hours to complete this examination.
8. A TI-30Xa calculator is permitted, no other calculator is allowed.
9. No scrap paper, notes, books, or collaborators are allowed.
10. Exact answers may contain π or radicals or logarithms.
11. Simplify all answers completely.
12. Problems involving units must have the units represented on the answer to receive full credit.

Name **(Print Clearly)**	
Student ID#	

Practice Departmental Final Exam Recommendations to Students:

- Take this practice final exam like an actual examination (not like doing homework). That is, create an "exam like" atmosphere. This practice exam should be taken after completing a thorough review of the material.
- Set aside a two-hour block of time with no interruptions (no facebook, texting, phone calls, restroom breaks, etc.).
- Do not use any help aids, such as notes, textbook, internet, scrap paper, MAC staff, etc.
- Work through all problems noting which concepts you know well and which ones you need to spend more time on.
- Grade your exam using the answers in the back of your textbook (the textbook section and exercise number is noted at the top right of each problem).
- Rework any problem on the exam that you missed and then work similar problems from the textbook until you can perform the operations without error.
- Follow the same recommendations for taking the Practice Final Exam Version #1.

MATH 15900 Practice Departmental Final Exam (Version #2)

TEXTBOOK: Swokowski & Cole, *Algebra & Trigonometry with Analytic Geometry*, Classic 12th Edition

To receive full credit you must show all your work. Simplify all answers completely. Be sure to check your final answers for errors. Problems involving units must have the units represented on the answer to receive full credit.

1. Simplify. (1.2 #45)

$$\frac{\left(x^6 y^3\right)^{-1/3}}{\left(x^4 y^2\right)^{-1/2}}$$

1. _____ (4)

2. ***Preparing a glucose solution*** In a certain medical test designed to measure carbohydrate tolerance, an adult drinks 7 ounces of a 30% glucose solution. When the test is administered to a child, the glucose concentration must be decreased to 20%. How much 30% glucose solution and how much water should be used to prepare 7 ounces of 20% glucose solution? (2.2 #13)

2. _____ (4)

3. Solve for the specified variable. (2.3 #53)

$A = 2\pi r(r + h)$ for r

3. _____ (4)

4. Solve the equation. (2.5 #45)

$2x^{-2/3} - 7x^{-1/3} - 15 = 0$

4. _____ (4)

5. Solve the inequality. Express the solution in **interval notation**. (2.7 #21)

$x^3 + 2x^2 - 4x - 8 \geq 0$

5 _____ (4)

6. Find an equation of the circle with center $C(-4, 6)$ and passing through the point $P(1, 2)$. (3.2 #39)

6. _____ (4)

7. Given the points $A(3, -1)$ and $B(-2, 6)$. Find an equation (in slope-intercept form) for the perpendicular bisector of segment AB.

(3.3 #37)

7. _____ (4)

8. Find the domain of $f(x) = \dfrac{\sqrt{2x-3}}{x^2 - 5x + 4}$. (3.4 #27)

8. _____ (4)

9. Given $f(x) = -2x^2 + 20x - 43$. (3.6 #21)

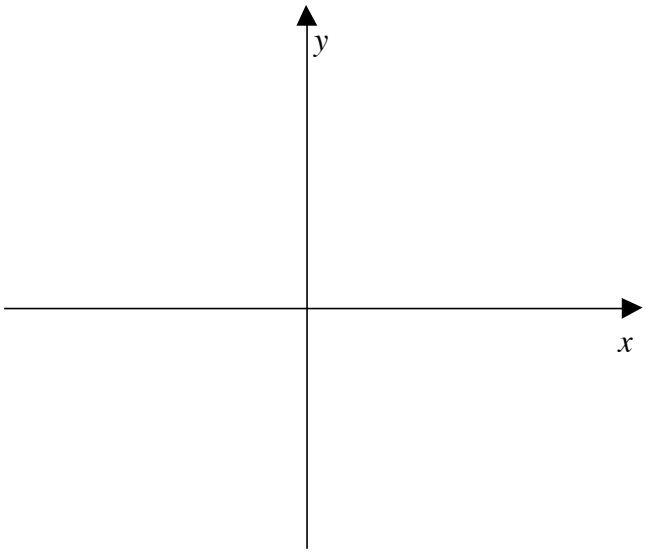
a) Use the quadratic formula to find the zeros of $f(x)$.

9a) _____ (2)

b) Find the maximum or minimum value of $f(x)$.

9b) _____ (2)

c) Sketch the graph of $f(x)$. (2)



10. Find the quotient and the remainder if $f(x) = 3x^3 + 2x - 4$ is divided $p(x) = 2x^2 + 1$. (4.2 #3)

10. _____ (4)

11. Given the one-to-one function $f(x) = \sqrt[3]{x} + 1$, find the inverse function, $f^{-1}(x)$. (5.1 #37)

11. _____ (4)

12. ***Compound interest*** If \$1000 is invested at a rate of 7% per year compounded monthly, find the balance after 6 months. (5.2 #41)

12. _____ (4)

13. If \$1000 is deposited in a savings account that pays interest at a rate of 8.25% per year compounded continuously, find the balance after 5 years. (5.3 #5)

13. _____ (4)

14. Find the **exact value** for the solution of the equation. (5.6 #19)

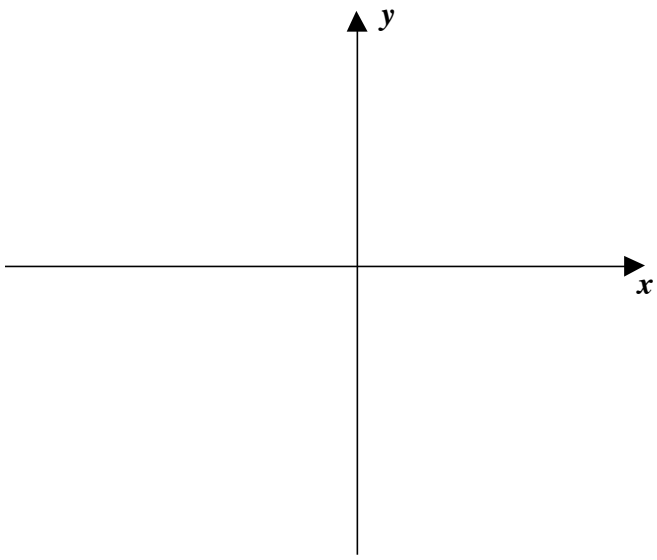
$$\log\left(x^2 + 4\right) - \log(x + 2) = 2 + \log(x - 2)$$

14. _____ (4)

15. Find the foci of the hyperbola. Sketch its graph showing the center, vertices and foci.

(11.3 #15)
(4)

$4y^2 - x^2 + 40y - 4x + 60 = 0$



16. ***Planning production*** A small furniture company manufactures sofas and recliners. Each sofa requires 8 hours of labor and $180 in materials, while a recliner can be built for $105 in 6 hours. The company has 340 hours of labor available each week and can afford to buy $6750 worth of materials. How many recliners and sofas can be produced if all labor hours and all materials must be used?

(9.2 #37)

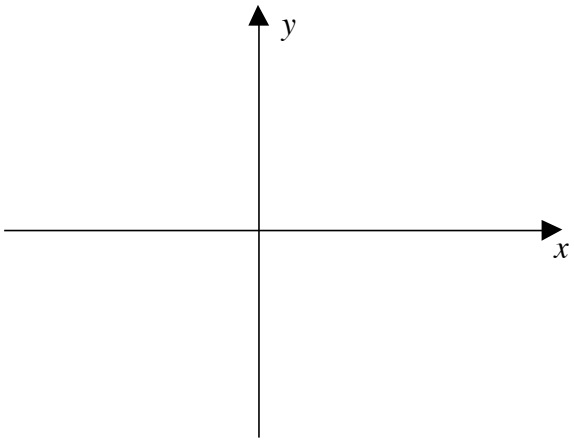
16. _____ (4)

17. Find the **exact value** of $\csc\theta$ if θ is in standard position and $P(-2,-5)$ is on the terminal side of θ.

(6.2 #73)

17. _____ (4)

18. Graph at least one complete period of $y = 1 + \tan x$. (6.3 #59)
(4)



19. Verify the identity. **Show all work.** (7.1 #11)
(4)

$(\sec u - \tan u)(\csc u + 1) = \cot u$

20. Find the **exact values** for the solutions of the equation that are in the interval $[0, 2\pi)$. (7.2 #43)

$2\sin^2 u = 1 - \sin u$

20. _____ (4)

21. Given $\sec\theta = -3;\ \ 90° < \theta < 180°$ find the **exact value** of $\sin 2\theta$, $\cos 2\theta$, and $\tan 2\theta$ (7.4 #3)

21a) $\sin 2\theta$: _____ (4)

21b) $\cos 2\theta$: _____ (4)

21c) $\tan 2\theta$: _____ (4)

22. In triangle *ABC* if $\alpha = 42°10'$, $\gamma = 61°20'$ and $b = 19.7$ find the value of **side *a***. (8.1 #5)

22. _____ (4)

23. Use **Heron's formula** to approximate the area of triangle *ABC*.

$a = 25.0$ ft, $b = 80.0$ ft, $c = 60.0$ ft (8.2 #39)

23. _____ (4)

Bonus: ***Airplane takeoff*** An airplane takes off at a 10° angle and travels at the rate of 250 ft/sec. Approximately how long does it take the airplane to reach an altitude of 15,000 feet? (6.7 #32)

Bonus: _____ (4)