

Math 117
Final Exam
Spring 2008

Make sure your work is kept organized and neat. Read instructions for each problem carefully. You must use the techniques presented in this course to answer the questions.

Place your answers on the indicated line or graph for all problems except the verify question (#4).

All fraction, rational expressions and radicals must be reduced and simplified completely.

Approximate only when directed. You may lose all credit for approximations when you are asked to find exact values.

Only scientific calculators are allowed, no graphing calculators.

This exam is worth 300 points. Please make sure your exam has 30 problems.

Name: _____

Section: _____

Section 10 meets MWF at 11:15

Section 11 meets MWF at 2:30

Instructor: B. Daley

Answer the following questions. Each question is worth 10 points unless otherwise indicated.

1. Solve the inequality: $(2x - 3)^2 \geq 0$ _____

2. Determine the domain of $f(x) = \sqrt{8 - 3x}$ _____

3. Determine the domain of $g(x) = \frac{2x - 3}{3x - 7}$ _____

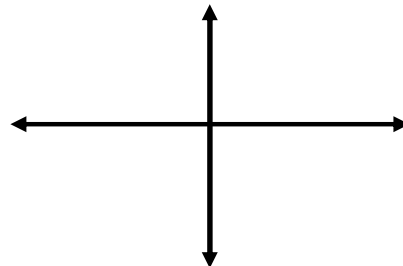
4. Verify the following: $\tan \theta + \frac{\cos \theta}{1 + \sin \theta} = \sec \theta$

5. Determine the exact value of $\log_3 \left(\frac{1}{\sqrt[5]{9}} \right)$ _____

6. Solve $\cos(x) = -.643$ over the interval $(0, 2\pi]$. Approximate your answers to the nearest hundredth and leave in radian measure.

7. Determine $f^{-1}(x)$ given $f(x) = \frac{2x}{x+1}$

8. Let $f(x) = ax^2 + bx + c$. Draw a sketch of $f(x)$ given the conditions $a > 0$ and $b^2 - 4ac < 0$.



9. Determine A and B given:
$$\frac{3x + 6}{(x - 2)(x + 1)} = \frac{A}{(x - 2)} + \frac{B}{(x + 1)}$$

$$A = \underline{\hspace{2cm}}$$

$$B = \underline{\hspace{2cm}}$$

10. Determine the exact solutions for $\sin(x) = \frac{-\sqrt{2}}{2}$ over the interval $(0, 2\pi]$. Leave your answer in radian measure.

11. Solve for x: $3^{x-1} = 8$. Do not approximate your answer.

12. Write a formula for the area, A , of a circle in terms of its circumference, C .

13. Using either an algebraic technique or a graphical technique, solve:

$(2x + 3)(x - 4)^2(x + 3) \geq 0$. Clearly show your work.

14. Determine the equation of a line perpendicular to $3x + y = 2$ and through the point $(-2, 7)$.

15. Using the addition identity, determine the exact value of: $\sin\left(\frac{5\pi}{6} + \frac{3\pi}{4}\right)$.

16. Solve: $\frac{2x+8}{x-3} \geq 0$

17. Let $f(x) = \frac{1}{x^2}$. Determine and simplify: $\frac{f(x+h) - f(x)}{h}$.

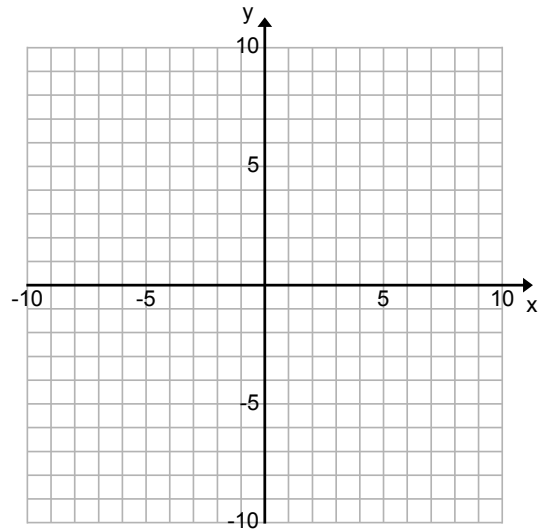
18. Simplify: $\frac{(x-4)^2(2)(2x+1) - (2x+1)^2(3)(x-4)}{(x-4)^2(2x+1)}$

19. Solve for the exact solutions: $2\cos^2(x) - \cos(x) - 1 = 0$ on $[0, 2\pi)$. Leave your answer(s) in radian measure.

For problems 20 – 22, fill in the information requested in the associated table. Then, graph the function neatly. To make your graphs fairly accurate, you may want to find a couple of points.

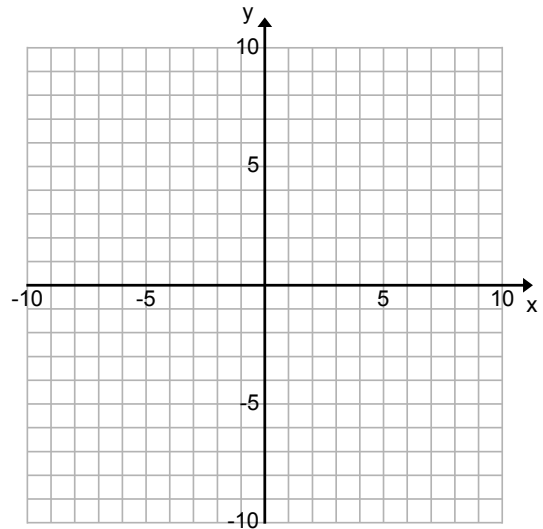
20. $f(x) = \log_2(x + 8)$

	Answers
Domain	
Range	
Asymptote(s)	
x-intercept(s)	
y-intercept	



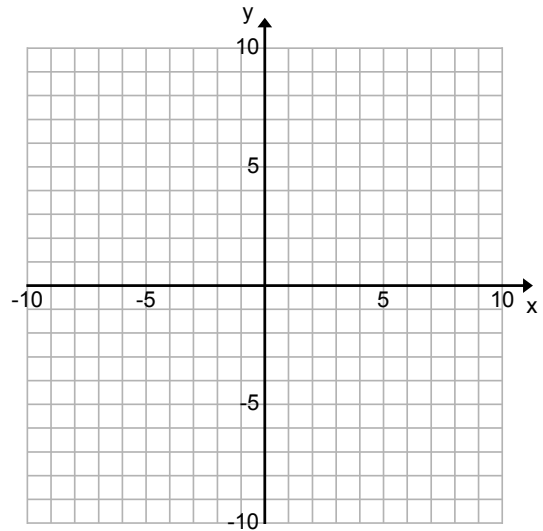
21. $f(x) = 2\sqrt{x + 4} - 3$

	Answers
Domain	
Range	
x-intercept(s)	
y-intercept	

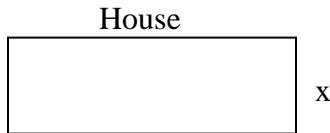


22. $f(x) = \frac{2x + 8}{x - 3}$ (NOTE: You may want to use the results from problem 16)

	Answers
Domain	
All asymptote(s)	
x-intercept(s)	
y-intercept	

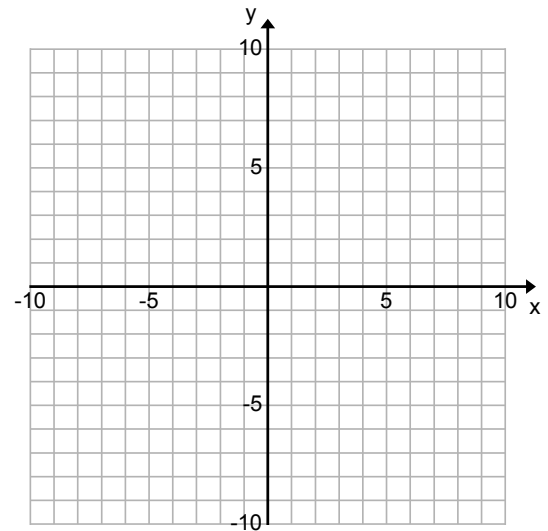


23. You have 40 feet of fencing to enclose a rectangular garden next to your house. Only three sides will need fencing. Determine a function that represents the area of the garden in terms of x , the length of the shorter side.

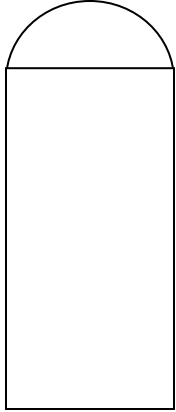


24. For the following system, draw a graph of each of the relations and then solve the system algebraically:

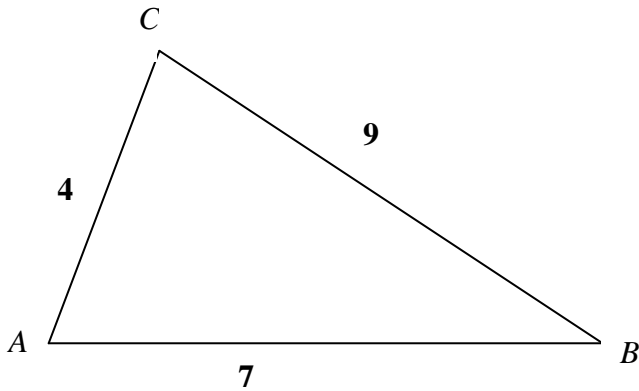
$$\begin{cases} x^2 + y^2 = 16 \\ x + y = 2 \end{cases}$$



25. A window is constructed in the shape of rectangle with a semicircle of radius r on top as shown. If the perimeter of the window is 60 feet, express the area as a function of r . Do not simplify your answer but clearly define your variables.



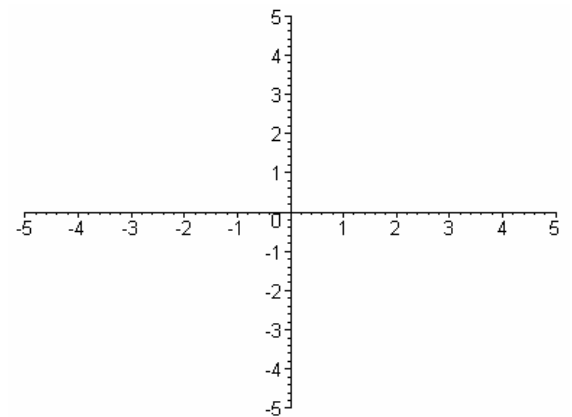
26. In triangle ABC find the measure of angle C in degrees to the nearest tenth.



27. A woman is driving directly toward the Gateway Arch in St. Louis, which is 630 feet high. She drives along a level road from a point at which the angle of elevation to the top of the arch is 40° , to a point where the angle of elevation to the top of the arch is 60° . To the near foot, how far has she driven?

28. Let $\tan(x) = \frac{-2}{3}$ where x is an angle in quadrant II. Determine the exact value of $\sin(2x)$.
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29. Graph the function: $f(x) = \begin{cases} x-1 & \text{if } x \geq 1 \\ 2^x & \text{if } x < 1 \end{cases}$



30. Let $f(x) = \frac{3+x}{2-x}$ and $g(x) = \frac{2}{x-4}$. Determine *and simplify* $(f \circ g)(x)$.
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