

Math 117
Exam 3
Spring 2008

Please write your answers in the space provided. Make sure your work is kept organized and neat. Read instructions for each problem carefully. This exam is worth 175 points. Please make sure your exam has 17 problems.

You must use the techniques presented in this class to answer the questions. All fraction, rational expressions and radicals must be reduced and simplified. Approximate only when directed. Only scientific calculators are allowed. No graphing calculators.

Name: _____

Section: _____

Section 10 meets MWF at 11:15

Section 11 meets MWF at 2:30

Instructor: B. Daley

Please show work for partial credit. Each problem is worth 10 points unless otherwise indicated.

1. Solve for x . Each answer should be a reduced rational number:

a. $\log_3\left(\sqrt{\frac{1}{27}}\right) = x$ _____

b. $\log_{32}(8) = x$ _____

c. $\log_x(9) = 2$ _____

2. (9 pts) Find the exact values of each of the following trigonometric expressions:

a. $\cos\left(\frac{13\pi}{4}\right)$ _____

b. $\sec\left(\frac{19\pi}{6}\right)$ _____

c. $\cot\left(\frac{\pi}{2}\right)$ _____

3. (6 pts) A wheel has a radius of 3 feet. If the wheel is rotating at the rate of one revolution per minute, how far does a point on the rim travel in one minute? Approximate your answer to one decimal place.

4. Solve for x: $\log_4(3x) + \log_4(x + 2) = \log_4(9)$

5. Solve for x: $7^{x-1} = 3$

6. The half-life of a radioactive substance is 12 days. Find the decay constant (the rate of decay) correct to three decimal places. (Formula: $A = A_0 e^{-kt}$)

7. A colony of bacteria is growing according to the exponential growth model, $A = A_0 e^{kt}$. Suppose 800 bacteria grow to 2000 in six hours. Approximate how many bacteria will be present in 16 hours.

8. Given that the $\tan(\theta) = \frac{-5}{4}$ and $\sin \theta < 0$, find $\sec \theta$.

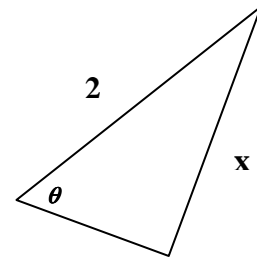
9. A helicopter is hovering directly above point A. The pilot observes point B 1000 yards due east of point A at an angle of depression of 27° . What is the altitude of the helicopter (to the nearest yard)?

10. Simplify: $\frac{3\cos^2 \theta - 6\cos \theta}{\cos^2 \theta - 4}$

11. Combine and write your answer as a reduced rational expression:

$$\frac{\sin \theta}{\sin \theta + \cos \theta} + \frac{\cos \theta}{\sin \theta - \cos \theta}$$

12. Express $\cos(\theta)$ in terms of x using the right triangle below:



13. Determine the exact value for $\sin \theta$ where θ is an angle in standard position and the point $(-1,5)$ is on the terminal side of θ .

14. Find the exact measure of two angles in radian measure that are not coterminal where

$$\sin(\theta) = \frac{-\sqrt{3}}{2}$$

15. Let $y = 4\cos(2x - \pi)$

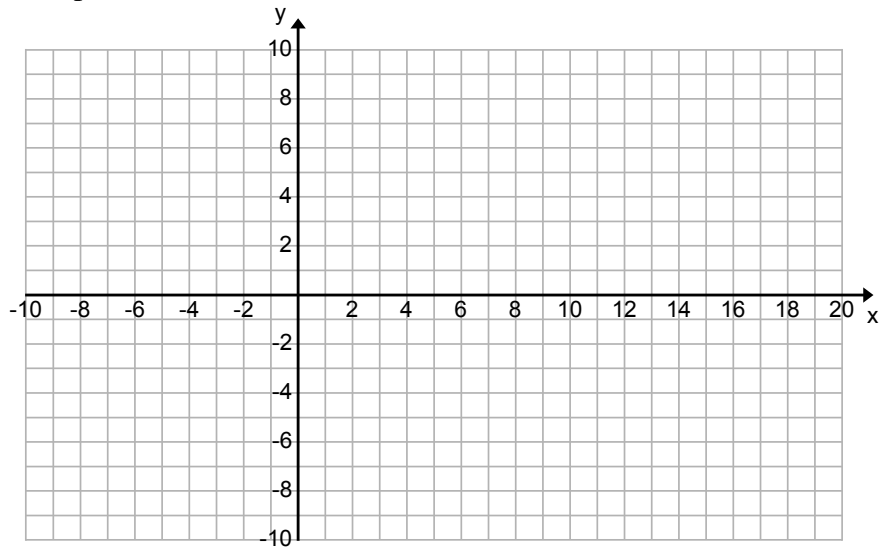
- Determine the period of the function. _____
- Determine the phase shift. _____
- Determine the amplitude. _____
- Graph one period of the function. Your graph should clearly indicate the exact x-intercepts as was done in class.



16. Solve for x: $(2^x)^2 - 9(2^x) + 20 = 0$. Hint: Look at the structure of the equation.

17. (20 pts) Let $f(x) = \log_3(x + 9) - 3$.

A. Graph $f(x)$ on the coordinate plane:



B. Fill out the following chart for $f(x)$:

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

C. Fill out the following chart for $f^{-1}(x)$

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

D. Find the algebraic representation for $f^{-1}(x)$