Study Guide Exam III

1. Verify the trigonometric identity: (extra credit)

$$\frac{\cos\theta}{1+\sin\theta}+\tan\theta=\sec\theta$$

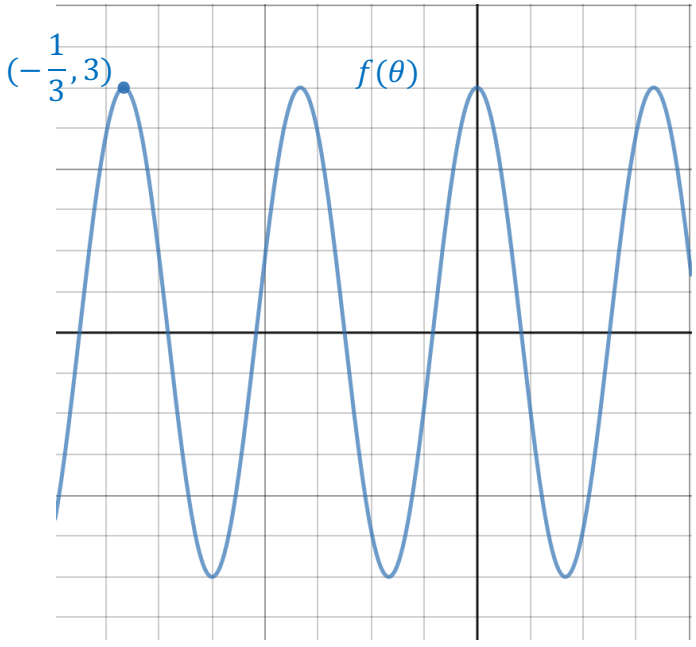
2. Calculate the given trigonometric value, showing all steps including a diagram

a. $\tan(-150°)$ b. $\csc(135°)$ c. $\cos(270°)$ d. $\sec\left(\frac{4\pi}{3}\right)$ e. $\cot\left(-\frac{5\pi}{2}\right)$ f. $\sin\left(\frac{5\pi}{3}\right)$

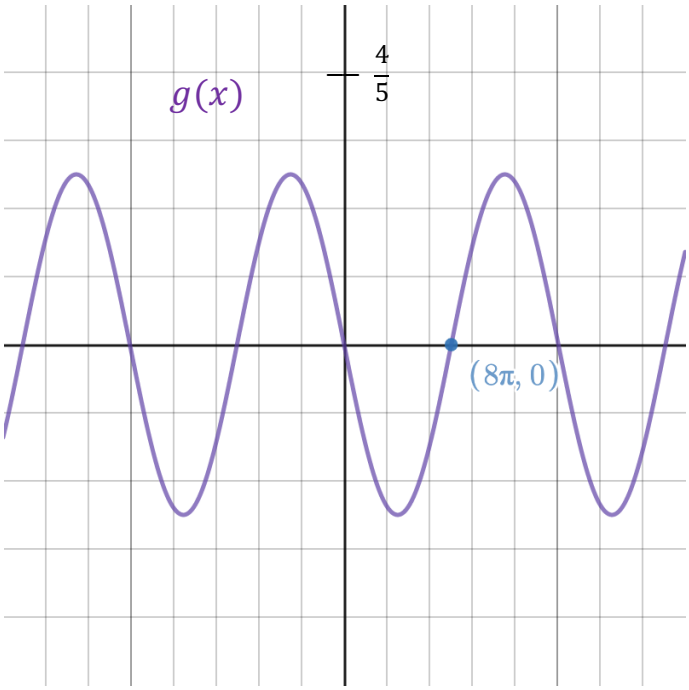
3. Solve on $[0,2\pi)$: (extra credit)

$$\cos\theta=-\frac{1}{\sqrt{2}}$$

4. Find the formula for the graph shown:



5. Find the formula for the graph shown:



6. Maria invested $4300 at 3.1 percent apr compounded continuously. How long until she has $5000 in the account? Calculate to the nearest day.

7. How much will she have in 8 years, 9 months?

8. An epidemic is spreading exponentially. If 2000 people had a virus on January 6, and 2400 had the virus on January 7, predict the number of people who have been infected on January 26.

9. A drug in the bloodstream depreciates at the rate of 18 percent every hour. What is the half-life of this drug, rounded to the nearest tenth of an hour?

10. The population of a particular city was 5 million and grew by 100,000 people in a single year. If we assume that the population continues to grow exponentially, how long, in years and days, until it hits 6 million?

11. The half-life of a particular drug in the bloodstream is 6 hours. If you take the drug at 7 a.m. in the morning, what percent of that dose, to the nearest whole percent, will still be in your system at 10 p.m.? (extra credit)

12. The terminal side of an angle θ lies on the line $y = \frac{1}{3}x$ and lies in Quadrant III. Find the exact secant of angle θ.

13. Solve the equation, using the method involving the drawing of a diagram in the coordinate plane showing the special triangles relevant to the associated angles. (extra credit)

$$2\sin^2\theta - \sin\theta - 1 = 0$$

14. Expand the expression using the properties of logarithms:

$$\log\left(\frac{\sqrt[3]{xy}}{10z^4}\right)$$

15. Graph two periods of the function: $h(t) = -4\cos\frac{2\pi t}{3}$

16. Graph two periods of the function: $f(t) = \frac{1}{2}\sin(12t)$

17. $\cos\theta = -\frac{2}{5}$ and θ lies in Quadrant III. Find $\cot\theta$.

Answers

1.

$$\frac{\cos\theta}{1+\sin\theta}+\tan\theta$$

$$=\frac{(1-\sin\theta)\cos\theta}{(1-\sin\theta)(1+\sin\theta)}+\frac{\sin\theta}{\cos\theta}$$

$$=\frac{\cos\theta-\sin\theta\cos\theta}{1-\sin^2\theta}+\frac{\sin\theta}{\cos\theta}$$

$$=\frac{\cos\theta-\sin\theta\cos\theta}{\cos^2\theta}+\frac{\cos\theta\sin\theta}{\cos\theta\cos\theta}$$

$$=\frac{\cos\theta-\sin\theta\cos\theta}{\cos^2\theta}+\frac{\sin\theta\cos\theta}{\cos^2\theta}$$

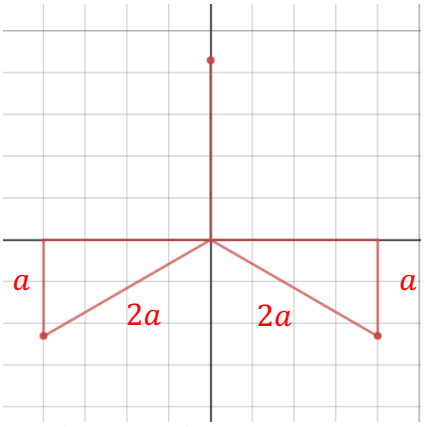
$$=\frac{\cos\theta}{\cos^2\theta}$$

$$=\frac{1}{\cos\theta}$$

$$=\sec\theta$$

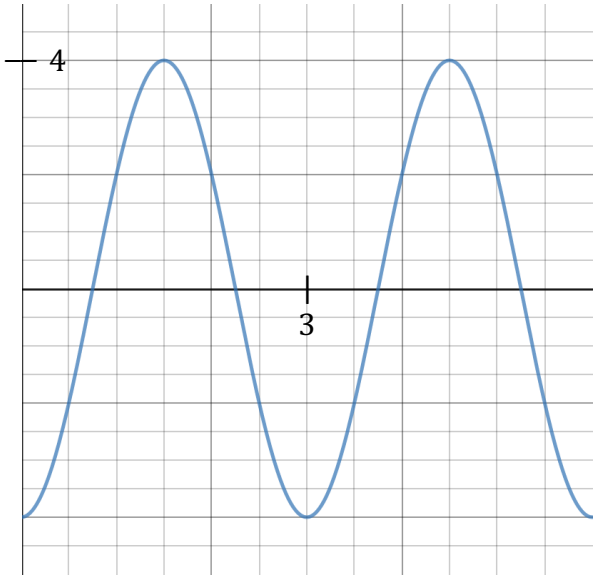
2. a. $\frac{1}{\sqrt{3}}$ or $\frac{\sqrt{3}}{3}$ b. $\frac{1}{\sqrt{2}}$ or $\frac{\sqrt{2}}{2}$ c. 0 d. $-\frac{1}{2}$ e. undefined f. $-\frac{\sqrt{3}}{2}$
3. $\left\{\frac{3\pi}{4},\frac{5\pi}{4}\right\}$
4. $f(\theta)=3\cos(12\pi\theta)$
5. $g(x)=-\frac{1}{2}\sin\left(\frac{x}{8}\right)$
6. 4 years, 316 days
7. $5,639.89
8. 76,675 people
9. 3.5 hours

10. 9 years 76 days
11. 18 percent
12. $-\frac{\sqrt{10}}{3}$
13. $\left\{\frac{\pi}{2}+2\pi k, \frac{7\pi}{6}+2\pi k, \frac{11\pi}{6}+2k\pi\right\} for\ all\ integers\ k$

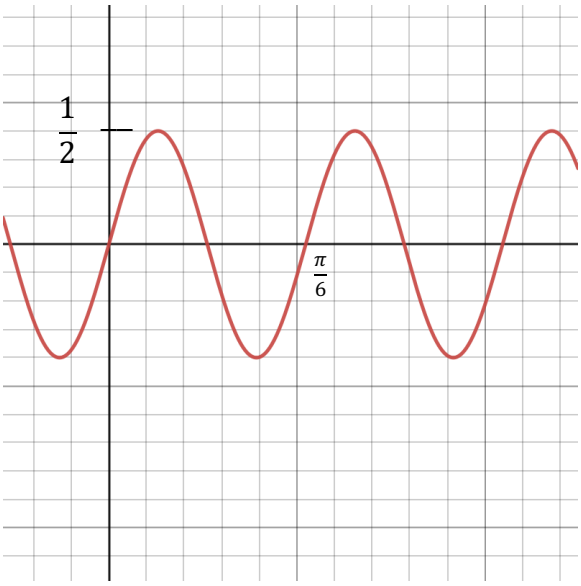


14. $\frac{1}{3}\log x+\frac{1}{3}\log y-1-4\log z$

15.



16.



17. $\frac{2}{\sqrt{21}}$ or $\frac{2\sqrt{21}}{21}$