1. Let \( f(x) = -7x^2 + 1 \) and \( g(x) = x^2 - 4x \), find \( f \cdot g \).

2. Given \( f(x) = -4x^2 - x - 1 \), evaluate \( f(-1) \).

3. Give the equation that represents each graph.
4. Let \( f(x) = -2(x + 1)^2(x - 2)^3 \). State the end behavior, zeros (x-intercepts) and y-intercept.

5. Find the inverse of \( h(x) = \frac{6x + 4}{2x + 3} \).
6. Given \( f(x) = \frac{x^2 + 7x + 12}{x^2 - 2x - 24} \).

Find:

A. any vertical asymptotes.

B. any holes.

C. horizontal asymptotes, if there is one.

RECALL:

Parabola: \((y - k)^2 = 4p(x - h)\) or \((x - h)^2 = 4p(y - k)\).

Circle: \((x - h)^2 + (y - k)^2 = r^2\)

Ellipse: \(\frac{(x - h)^2}{\text{number}} + \frac{(y - k)^2}{\text{number}} = 1\)

Hyperbola: \(\frac{(x - h)^2}{a^2} - \frac{(y - k)^2}{b^2} = 1\) or \(\frac{(y - k)^2}{a^2} - \frac{(x - h)^2}{b^2} = 1\)

7. Graph \(y^2 = 16x\). Find vertex, focus and directrix.
8. Graph \( x^2 = -12y \). Find vertex and focus.

9. Find the asymptotes of:
   A. \( \frac{y^2}{16} - \frac{x^2}{9} = 1 \)
   B. \( \frac{x^2}{36} - \frac{y^2}{9} = 1 \)

10. Find the foci.
    \( \frac{x^2}{16} + \frac{y^2}{9} = 1 \)

11. Write the equation of the circle with center \((-5, 2)\) and has radius \(3\sqrt{5}\).
12. Write \( y^2 + 2y + 8x + 17 = 0 \) in standard form. Find vertex.

13. Find the x-value(s) of the point(s) of intersection of:
   \[
   f(x) = -2x^2 + 8x - 5 \\
   g(x) = 6x - 5
   \]

14. Evaluate.
   A. \( \cos \left( -\frac{3\pi}{4} \right) \) 
   B. \( \cot \left( \frac{7\pi}{6} \right) \)

15. Evaluate.
   A. \( \sin^{-1} \left( -\frac{1}{2} \sqrt{3} \right) \) 
   B. \( \cos^{-1} \left( \frac{\sqrt{2}}{2} \right) \)
16. Find \( \sec \left( \sin^{-1} \left( \frac{8}{11} \right) \right) \).

17. Suppose that \( \pi < \alpha < \frac{3\pi}{2} \) and that \( \tan(\alpha) = \frac{4}{7} \sqrt{2} \). Find the rest of the trigonometric functions of \( \alpha \).

18. Write a sine function with amplitude 5 and the period is 2.
19. Which of these is an equation of one of the asymptotes of the following function?

\[ g(x) = \sec \left( \frac{\pi}{2} x \right) \]

A. \( x = \frac{\pi}{4} \)  
B. \( x = \frac{\pi}{2} \)  
C. \( x = 3 \)  
D. \( x = 2 \)

20. Find the phase shift for the following function:

\[ f(x) = 5 \cos \left( \frac{1}{3} \pi x + \pi \right) + 4 \]

21. Sketch the graph of:
A. \( f(x) = 5 \sin(2x) \). Label, for one period, x-, y-intercepts as ordered pairs; max value(s), min value(s) as ordered pairs. Domain and Range of the function. State, if any, vertical/horizontal asymptotes.
B. \( g(x) = 7 \cos(5x) \). Label, for one period, x-, y-intercepts as ordered pairs; max value(s), min value(s) as ordered pairs. Domain and Range of the function. State, if any, vertical/horizontal asymptotes.

22. Given \( \sin(y) = \frac{5}{7} \) with \( 90^\circ < y < 180^\circ \), find the exact value of \( \sin\left(\frac{\pi}{4} + y\right) \).

23. Find the area of an equilateral triangle with side lengths 8.

24. In triangle ABC, angle C is \( 90^\circ \), angle B is \( 55^\circ \) and side AB is 20. Find AC.
25. A ramp leading to the freeway overpass is 190 feet long and rises 32 feet. What is the angle of elevation of the ramp to the freeway?

26. Find the area of triangle XYZ if \( \angle Y = 90^\circ \), \( x = 9 \) and \( y = 6 \).

27. In triangle DEF \( \sin x = \frac{\sqrt{3}}{2} \), what are the possible angles of \( x \).

28. Determine all solutions to \( \sin(3x) = 1 \) on the interval \( [0, \frac{\pi}{2}) \).
29. Solve. \( \sin(2x) = -12\cos x \) on \([0, 2\pi]\).

30. ABC is a triangle with \( AB = 10 \), \( BC = 13 \), and \( AC = 7 \). Find \( \cos(A) \).

Note: You are asked to find \( \cos(A) \) not the measure of angle A. Do not use a calculator.

31. Given triangle ABC with \( AB = 5 \) and \( BC = \frac{5}{3} \sqrt{3} \). The measure of angle A is 30°.

What is the possible measures of angle C?
32. Simplify.
\[
\frac{\sin x}{1 - \cos x} - \frac{\sin x}{1 + \cos x}
\]

33. Simplify.
\[
1 - (\sin^2 x + 2\sin x \cos x + \cos^2 x)
\]