1. $<$, $>$, or $=$.
   (a) $\tan(100°)$ $\tan(1°)$
   (b) The solution x of $\log_{\sqrt{8}} x = \frac{8}{3}$ 10
   (c) The period of the function $f(x) = 3\sin(\pi x - 5) + 7$ The amplitude of the function $f(x) = 3\sin(\pi x - 5) + 7$
   (d) $3\log_2 3$ $2\log_5 6$
   (e) The period of $f(x) = 4\tan(3x)$ The period of $g(x) = 4\cos(3x)$
2. Find all solutions to $\sin(2x) + \cos x = 0$ on the interval $[0, 2\pi)$.
3. Give an example of a function that is neither even nor odd, and explain why it is neither.
4. Find the first term of a geometric sequence whose second term is 8 and whose fifth term is 27.
5. Where is the function $f(x) = \frac{\sqrt{\sin x}}{x^2 - 4x + 3}$ defined on the interval $[0, 2\pi]$? Write your answer as a union of intervals.
6. Find the fifth term of the recursive sequence defined by the equations $a_1 = 2$ and $a_{n+1} = \frac{1}{a_n + 1}$.
7. Find an exact expression for $\sin(75°)$.
8. Find all real numbers x such that $12x^4 + 5x^2 - 2 = 0$.
9. Find the domain and range of $f(x) = \log(-x)$. What is the inverse function of $f(x)$? Find the domain and range of the inverse function of $f(x)$.
10. Prove the following identity
$$\sin\theta\cos\theta = \frac{\tan\theta}{1 + \tan^2\theta}.$$
11. Find the linear function, $y = mx + b$, that passes through the vertices of $y = x^2 + 4x$ and $y = 2(x + 1)^2$.
12. A population of 8 frogs increases at an annual rate of 50% a year. How many frogs will there be in 4 years?
13. Suppose $\sin u = \frac{3}{7}$. Evaluate $\cos(2u)$.
14. Suppose $9^x = 4$. Evaluate $(\frac{1}{27})^{2x}$.
15. The function f is defined by $f(-3) = 8$, $f(1) = 4$, and $f(4) = -8$. Make a table for $g(x)$ where $g(x) = 2f(-5x + 1) - 3$.
16. What is $\sin^{-1}(\sin(\frac{3\pi}{4}))$?
17. Find a number t such that the equation $x^2 + 8x + t = 0$ has exactly one solution.
18. What is the minimum value of the function f defined by $f(x) = 9x^2 + 30x + 18$?
19. Find an exact expression for $\sin(\frac{\pi}{16})$.
20. Evaluate $\sum_{j=1}^{22}(-5)^j$.
21. Write $2^8\frac{4^{77}}{16^{28}}$ as a power of 4.
22. Find the smallest possible positive number x such that $16\sin^4 x - 16\sin^2 x + 3 = 0$.
23. Let $f(x) = \frac{x^4 - 2x^2 - 35}{2x^4 - 8}$. Find the vertical and horizontal asymptotes of $f(x)$. What are the zeros of f?
24. Write $\frac{3 + 5i}{(1 - 3i)^2}$ in $a + bi$ form.
25. Give an example of an odd function whose domain is the real numbers and whose range is $\{-\pi^2, 0, \pi^2\}$.
26. Calculate $\log(\frac{1}{2}) + \log(\frac{2}{3}) + ... + \log(\frac{99}{100})$.

27. High tide at La Jolla Cove occurs at 5 am and is 6.5 ft. Low tide occurs at 11 am and is -0.5 ft. A simple model for such tides could be a cosine function of the form $f(x) = a\cos(bx + c) + d$. Determine the values for $a > 0$, b, c, and d for $f(x)$ where x represents the number of hours since midnight. Sketch f(x).

28. Evaluate $1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8} + ... + \frac{1}{2^{80}} - \frac{1}{2^{81}}$.

29. Evaluate $\cos(\tan^{-1} 5)$.

30. Write the series explicitly and evaluate the sum of $\sum_{k=0}^{3} \log(k^2 + 2)$.

31. Convert the polar coordinates given to rectangular coordinates in the xy-plane.
    (a) $r = 4$, $\theta = 101\pi$
    (b) $r = 6\pi$, $\theta = \dfrac{11\pi}{4}$

32. Find the first term of a geometric sequence whose second term is 6 and whose fifth term is 162.

33. Simplify each of the following expressions.
    (a) $\sin^{-1}(\cos(\frac{5\pi}{6}))$
    (b) $\sin(\cos^{-1} x)$

34. Solve for x in the following equations.
    (a) $\log_4 x + \log_4(x - 3) = 1$
    (b) $e^x + 2e^{-x} = 3$

35. Each year the local country club sponsors a tennis tournamennt. Play starts with 128 participants. During each round, half of the players are eliminated. How many players remain after 5 rounds?

36. Show that $\sin^2(2x) = 4(\sin^2 x - \sin^4 x)$.

37. Compute the sum of the first 20 terms of the sequence whose n^{th} term is given by $a_n = 3 + 2(n - 1)$.

38. Sketch the graph of the function $4\sin(2x + 1) + 5$ on the interval $[-3\pi, 3\pi]$.

39. Let $f(x) = \dfrac{6x + 1}{5x - 9}$.
    (a) Find the domain of f.
    (b) Find the range of f.
    (c) Find a formula for f^{-1}.
    (d) Find the domain of f^{-1}.
    (e) Find the range of f^{-1}.

40. Evaluate $\sum_{m=2}^{\infty} \dfrac{5}{6^m}$.

41. Simplify the expression $\left(\dfrac{(3t^9w^{-5})^4}{(t^{-3}w^7)^5}\right)^{-2}$.

42. Suppose you go to the fair and decide to ride the Ferris Wheel. The Ferris Wheel has a 30 meter diameter and turns 3 revolutions per minute with its lowest point 1 meter off the ground. Assume your height h above the ground is a function of the form $h(x) = a\cos(bx + c) + d$, where $x = 0$ represents the lowest point on the wheel and x is measured in seconds. Find the values of $a > 0$, $b > 0$, c, and d, and sketch $h(x)$.

43. Show that $2 - \log x = \log\left(\dfrac{100}{x}\right)$ for every positive x.

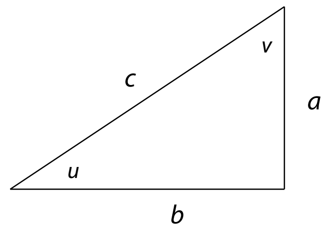
44. About how many years does it take for \$600 to become \$1800 when compounded continuously at 8% per year?

45. Suppose $\frac{\pi}{2} < \theta < \pi$ and $\tan\theta = -4$. Evaluate
    (a) $\cos\theta$
    (b) $\sin\theta$

46. Find exact values for the following
    (a) $\sin(-\frac{3\pi}{2})$
    (b) $\cos\frac{15\pi}{4}$
    (c) $\cos 360045°$
    (d) $\sin 300°$

47. Use the figure to the right to solve the following:

    Suppose $a = 3$ and $c = 8$. Evaluate



    (a) $\cos v$

    (b) $\sin v$

    (c) $\tan v$

48. Evaluate $\cos(\cos^{-1}\frac{2}{5})$.

49. Find a number b such that $\cos x + \sin x = b\sin(x + \frac{\pi}{4})$.

50. Show that $\dfrac{\sin x}{1-\cos x} = \dfrac{1+\cos x}{\sin x}$ for every x that is not an integer multiple of π.

51. For $f(x) = \dfrac{x-1}{x^2+1}$ and $g(x) = \dfrac{x+3}{x+4}$, find the formulas for
    (a) $f \circ g$
    (b) $g \circ f$
    Simplify your results as much as possible.

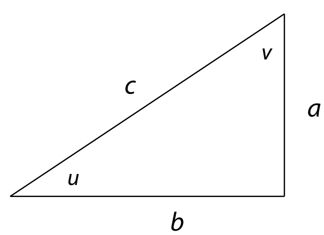
52. Suppose $g(x) = x^7 + x^3$. Evaluate $(g^{-1}(4))^7 + (g^{-1}(4))^3 + 4$.

53. Evaluate the expression $\sin\left[\sec^{-1}(\frac{5}{3}) + \tan^{-1}(\frac{3}{4})\right]$.

54. Find the 100^{th} term of an arithmetic sequence whose tenth term is 5 and whose eleventh term is 8.

55. Use the figure to the right to solve the following:

    Suppose $b = 3$ and $\sin v = \frac{1}{3}$.
    Evaluate a.



56. Evaluate $\displaystyle\lim_{n\to\infty}\frac{4n^2+1}{3n^2-5n}$.

57. Let $g(x)$ be of the form $g(x) = a\cos(bx + c) + d$. Find the values for a, b, c, and d with $a > 0$, $b > 0$, and $0 \le c \le \pi$ so that g has range $[-3, 4]$, $g(0) = 2$, and g has period 5.