2. Identifying Mountain Peaks in Hawaii

Suppose that you are standing on the southeastern shore of Oahu and you see three mountain peaks on the horizon. You want to determine which mountains are visible from Oahu. The possible mountain peaks that can be seen from Oahu and the height (above sea level) of their peaks are given in the table.

<table>
<thead>
<tr>
<th>Island</th>
<th>Distance (miles)</th>
<th>Mountain</th>
<th>Height (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lanai</td>
<td>65</td>
<td>Lanaihale</td>
<td>3,370</td>
</tr>
<tr>
<td>Maui</td>
<td>110</td>
<td>Haleakala</td>
<td>10,023</td>
</tr>
<tr>
<td>Hawaii</td>
<td>190</td>
<td>Mauna Kea</td>
<td>13,796</td>
</tr>
<tr>
<td>Molokai</td>
<td>40</td>
<td>Kamakou</td>
<td>4,961</td>
</tr>
</tbody>
</table>

(a) To determine which of these mountain peaks would be visible from Oahu, consider that you are standing on the shore and looking “straight out” so that your line of sight is tangent to the surface of Earth at the point where you are standing. Make a sketch of the right triangle formed by your sight line, the radius from the center of Earth to the point where you are standing, and the line from the center of Earth through Lanai.

(b) Assuming that the radius of Earth is 3960 miles, determine the angle formed at the center of Earth.

(c) Determine the length of the hypotenuse of the triangle. Is Lanaihale visible from Oahu?

(d) Repeat parts (a)–(c) for the other three islands.

(e) Which three mountains are visible from Oahu?

3. CBL Experiment

Using a CBL, the microphone probe, and a tuning fork, record the amplitude, frequency, and period of the sound from the graph of the sound created by the tuning fork over time. Repeat the experiment for different tuning forks.

Cumulative Review

1. Find the real solutions, if any, of the equation
   
   \[ 2x^2 + x - 1 = 0. \]

2. Find an equation for the line with slope \(-3\) containing the point \((-2, 5)\).

3. Find an equation for the circle of radius 4 and center at the point \((0, -2)\).

4. Graph the equation \(2x - 3y = 12\).

5. Graph the equation \(x^2 + y^2 - 2x + 4y - 4 = 0\).

6. Use transformations to graph the function \(y = (x - 3)^2 + 2\).

7. Sketch a graph of each of the following functions. Label at least three points on each graph.
   
   (a) \(y = x^2\)
   (b) \(y = x^3\)
   (c) \(y = e^x\)
   (d) \(y = \ln x\)
   (e) \(y = \sin x\)
   (f) \(y = \tan x\)

8. Find the inverse function of \(f(x) = 3x - 2\).

9. Find the exact value of \((\sin 14^\circ)^2 + (\cos 14^\circ)^2 - 3\).

10. Graph \(y = 3\sin(2x)\).
11. Find the exact value of $\tan \frac{\pi}{4} - 3 \cos \frac{\pi}{6} + \csc \frac{\pi}{6}$.

12. Find an exponential function for the following graph. Express your answer in the form $y = Ab^x$.

13. Find a sinusoidal function for the following graph.

14. (a) Find a linear function that contains the points $(-2, 3)$ and $(1, -6)$. What is the slope? What are the intercepts of the function? Graph the function. Be sure to label the intercepts.
   (b) Find a quadratic function that contains the point $(-2, 3)$ with vertex $(1, -6)$. What are the intercepts of the function? Graph the function.
   (c) Show that there is no exponential function of the form $f(x) = ae^x$ that contains the points $(-2, 3)$ and $(1, -6)$.

15. (a) Find a polynomial function of degree 3 whose $y$-intercept is 5 and whose $x$-intercepts are $-2, 3,$ and 5. Graph the function. Label the local minima and local maxima.
   (b) Find a rational function whose $y$-intercept is 5 and whose $x$-intercepts are $-2, 3,$ and 5 that has the line $x = 2$ as a vertical asymptote. Graph the function. (Answers may vary.) Label any local maxima or minima.