1. Let \( h(x) = \sqrt{x - \sqrt{x}} \). Find \( h^{-1}(x) \). State the domain and range for \( h(x) \) and \( h^{-1}(x) \).

2. a. Assume \( f(x) \) is even, complete the table below:

\[
\begin{array}{ccccccccc}
x & | & -3 & -2 & -1 & 0 & 1 & 2 & 3 \\
f(x) & | & & & & & & & \\
\end{array}
\]

b. Assume \( f(x) \) is odd, complete the table below:

\[
\begin{array}{ccccccccc}
x & | & -3 & -2 & -1 & 0 & 1 & 2 & 3 \\
f(x) & | & & & & & & & \\
\end{array}
\]

c. Can a function be both odd and even? If so, then assume \( f(x) \) is both even and odd and complete the table below. If not, then explain.

\[
\begin{array}{ccccccccc}
x & | & -3 & -2 & -1 & 0 & 1 & 2 & 3 \\
f(x) & | & & & & & & & \\
\end{array}
\]

3. Find functions \( f \) and \( g \) such that \( h = f \circ g \).
   a. \( h(x) = 3(\sin x)^2 + 4 \sin x \)
   b. \( h(x) = \frac{\tan x}{3 + \tan x} \)

4. Generally, the more fertilizer that is used, the better the yield of crop. However, if too much fertilizer is applied, the crops become poisoned, and the yield goes down rapidly. Sketch a possible graph showing the yield of the crop as a function of the amount of fertilizer.
5. a. Find constants $A$, $B$, $C$ and $k$ such that the function $f(x) = A \cdot B^x + C$ satisfies all four of the following conditions:
   - $f(x)$ is an increasing function,
   - $f(x) < 0$ for $x < 0$,
   - $f(x) > 0$ for $x > 0$, and
   - $f(x) < 2$ for all $x$.

b. Write the equation of the function that is obtained by shifting $f(x)$ two units to the left.

6. Find the domain and range of $f(x) = \frac{5}{3 - \cos 2x}$.

7. Solve the following algebraically:
   a. $\ln(3x + 8) = \ln(2x + 2) + \ln(x - 2)$
   b. $2e^{3x} = 4e^{5x}$

8. Find the exact value of each expression:
   a. $\log_{1.5} \frac{27}{8}$
   b. $\log_{0.03} \frac{100}{9}$

9. Let $f(x) = \frac{e^x + e^{-x}}{2}$ and $g(x) = \ln\left(x + \sqrt{x^2 - 1}\right)$. What are the domains of $f + g$, $fg$, $f/g$?

   Extra Credit: What is the domain of $f \circ g$ OR $g \circ f$.
10. The graph below shows the temperature of a room during a summer day as a function of time, starting at midnight.

```
<table>
<thead>
<tr>
<th>Time (t)</th>
<th>Temperature (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>60</td>
</tr>
<tr>
<td>6</td>
<td>80</td>
</tr>
<tr>
<td>12</td>
<td>100</td>
</tr>
<tr>
<td>18</td>
<td>70</td>
</tr>
<tr>
<td>24</td>
<td>50</td>
</tr>
</tbody>
</table>
```

a. Evaluate \( f(\text{noon}) \) and \( f(6 \text{ p.m.}) \). State the range of \( f \).

b. Where is \( f \) increasing? Decreasing?

c. Give a possible explanation for what happened at noon.

d. Give a possible explanation why \( f \) attains its minimum value at 6 a.m.

11. Let \( f \) be the function whose graph is given below.

```
<table>
<thead>
<tr>
<th>t (sec)</th>
<th>v (mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>30</td>
</tr>
<tr>
<td>10</td>
<td>60</td>
</tr>
</tbody>
</table>
```

a. Estimate the value of \( f(4) \).

b. Estimate the value(s) of \( x \) such that \( f(x) = 40 \).

c. On what interval is \( f \) increasing? Decreasing?

d. Is \( f \) one-to-one? Explain.

e. What is the domain and range of \( f^{-1} \)?

f. Estimate the value(s) of \( f^{-1}(8) \).

g. Extra Credit: Estimate where \( f(x) = f^{-1}(x) \).