1. (a) $f(2)$ is negative since the graph is below the $x$-axis at this point.
   (b) $f'(2)$ is negative since the function is decreasing at this point.
   (c) $f''(2)$ is positive since the graph is concave up at this point.

2.  
   \[
   \begin{array}{c|ccc}
   \text{Point} & f & f' & f'' \\
   \hline
   A & \text{zero} & \text{zero} & \text{positive} \\
   B & \text{positive} & \text{zero} & \text{negative} \\
   C & \text{positive} & \text{negative} & \text{negative} \\
   D & \text{negative} & \text{positive} & \text{positive} \\
   \end{array}
   \]

3. The second derivative is only positive at $A$ and $B$; of these, the first derivative is only positive at $B$.

4. Such a function must be increasing and concave up everywhere; $f(x) = e^x$ will work.

5. See below.

6. This needs to be increasing and concave down.

   ![Graphs](Number 4, Number 5, Number 6)

7. $f'(x)$ will be positive since the function is increasing. $f''(x)$ will also be positive since the function is concave up.

8. $f'(x) = 0$ since the function is constant, and $f''(x) = 0$ since $f'(x)$ is also constant.

9. $f'(x)$ is negative since the function is decreasing, and $f''(x) = 0$ since $f'$ is constant.

10. $f'(x)$ is negative since the function is decreasing, and $f''(x)$ is positive since the function is concave up.

11. $f'(x)$ is positive since the function is increasing, and $f''(x)$ is negative since the function is concave down.

12. $f'(x)$ is negative since the function is decreasing, and $f''(x)$ is negative since the function is concave down.

14. (a) The derivative appears to be positive if $x < -0.5$ and negative if $x > -0.5$.
    (b) The second derivative appears to be negative if $x < 1.5$ and positive if $x > 1.5$. (Examine the concavity.)

15. (a) The derivative is positive if $x < 0.4$ or if $1.75 < x < 3.4$ (roughly) and negative if $0.4 < x < 1.75$ or if $x > 3.4$. 
(b) The second derivative is negative if $0 < x < 1$ or if $2.5 < x < 4$. It is positive if $1 < x < 2.5$.

18. We need to be increasing everywhere, concave down up to $x = 2$, and then concave up.

23. (a) At $B$ both $f'$ and $f''$ are positive. At $E$ both are negative.

(b) At $A$, $f$ and $f'$ are zero, At $D$, $f'$ and $f''$ are both zero.