1. The graph below is a graph of \( y = g''(x) \).

(a) On what interval(s) is \( g' \) decreasing? Justify your answer.

\[(1a) \quad (-\infty, -3) \text{ or } (-3, 2, -3)\]

\( g'' \) is negative valued the slope of \( g' \) is negative hence \( g' \) is decreasing

(b) For what \( x \)-value(s) does \( g \) have an inflection point? Justify your answer.

\[(1b) \quad x = -3\]

\( g \) has an inflection point when the concavity changes. The concavity of \( g \) changes when the sign of \( g'' \) changes. The only place that happens is at \( x = 3 \).

2. The graph below is a graph of \( y = f(x) \). Sketch a graph of \( f'(x) \).
3. Let \( h'(x) = \sqrt{x} - 3 \).

(a) Is \( h(x) \) increasing at \( x = 1 \)? Justify your answer.

\[
h'(1) = \sqrt{1} - 3 = -2
\]

(3a) \( \text{No} \) \( \because \) \( h'(1) \) is negative

The slope of \( h(x) \) at \( x=1 \) is negative hence \( h(x) \) is decreasing there.

(b) Is \( h(x) \) concave up at \( x = 4 \)? Justify your answer.

\[
\text{The slope of } h'(x) \text{ is positive at } x=4, \text{ so } h''(4) > 0, \text{ hence } h(x) \text{ is concave up.}
\]

(3b) \( \text{Yes} \)

(c) Why does \( h(x) \) have a stationary point at \( x = 9 \)?

\[
b/c \quad h'(9) = \sqrt{9} - 3 = 0
\]

(3c) \( \text{and stationary points are when } h'(x) = 0 \).

(d) Is the stationary point at \( x = 9 \) a local minimum, local maximum, or neither? Justify your answer.

(3d) \( \text{local minimum} \)

\[
b/c \quad h'(x) < 0 \text{ when } 0 < x < 9 \text{ so } h(x) \text{ is decreasing from } 0 \text{ to } 9
\]

and \( h'(x) > 0 \text{ when } 9 < x \text{ so } h(x) \text{ is increasing from } 9 \text{ to } \infty \).

Together this means \( h(x) \) has a local minimum at \( x = 9 \).