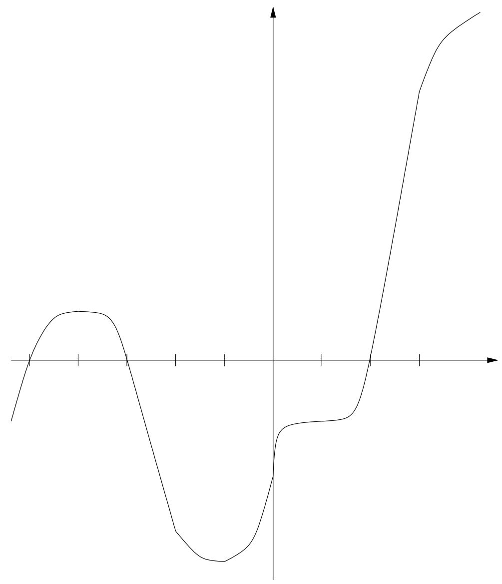
Answers for class prep quiz on section 4.5, Stewart's Calculus (8th ed.)

As mentioned, here is a qualitatively correct sketch of the graph of $f(x)$:



1. **Answer:** (d). By THE BOX, $f(x)$ is increasing when $f'(x) > 0$, which occurs for $x < -4$, $-1 < x < 1$, and $1 < x$. Moreover, if f is increasing on the intervals $[-1, 1]$ and $[1, +\infty]$, then f must actually be increasing on the entire interval $[-1, +\infty]$.

2. **Answer:** (b). By definition, an inflection point of f is a point where f'' changes sign. By the description of f, we see that this happens to occur at each point where $f''(x) = 0$, namely, $x = -2, 0, 1, 3$.

3. **Answer:** (c). By the first derivative test, f has a local minimum at $x = a$ exactly if f is decreasing for x just before a and f is decreasing for x just after a, and this happens only at $x = -1$. Note that f has a local maximum at $x = -4$, and f has neither a local min nor a local max at $x = 1$.

4. **Answer:** (d).

   - We know that $f(2) = 0$ and f is increasing for $x \geq -1$. Therefore, $\lim\limits_{x \to +\infty} f(x)$ must be positive, so of the given possibilities, only $\lim\limits_{x \to +\infty} f(x) = +300$ makes sense.

- We also know that for $x < -4$, f is increasing and concave down. Therefore, as we can see from the sketched graph of f, as $x \to -\infty$, $f(x)$ decreases faster and faster, which means that $\lim_{x \to -\infty} f(x) = -\infty$.