Quick Review 3.1 *(For help, go to Sections 2.1 and 2.4.)*

In Exercises 1–4, evaluate the indicated limit algebraically.

1. $\lim_{h\to 0} \dfrac{(2+h)^2 - 4}{h}$

2. $\lim_{x\to 2^+} \dfrac{x+3}{2}$

3. $\lim_{y\to 0^-} \dfrac{|y|}{y}$

4. $\lim_{x\to 4} \dfrac{2x-8}{\sqrt{x}-2}$

5. Find the slope of the line tangent to the parabola $y = x^2 + 1$ at its vertex.

6. By considering the graph of $f(x) = x^3 - 3x^2 + 2$, find the intervals on which f is increasing.

In Exercises 7–10, let

$$f(x) = \begin{cases} x+2, & x \le 1 \\ (x-1)^2, & x > 1. \end{cases}$$

7. Find $\lim_{x\to 1^+} f(x)$ and $\lim_{x\to 1^-} f(x)$.

8. Find $\lim_{h\to 0^+} f(1+h)$.

9. Does $\lim_{x\to 1} f(x)$ exist? Explain.

10. Is f continuous? Explain.