Answers for class prep quiz on sections 2.2–2.3, Stewart's Calculus (8th ed.)

1. **Answer:** (d). As x approaches -1, it appears that $g(x)$ approaches -1 on the left and $+1$ on the right, so there is no single y value that $g(x)$ approaches. In other words, the limit does not exist. The fact that $g(-1) = 0$ is irrelevant.

2. **Answer:** (b). It seems that for some values of $x > 0$, as $x \to 0^+$, $f(x)$ approaches a value around 1.7 or 1.8; and for other values of $x > 0$, as $x \to 0^+$, $f(x)$ approaches a value around 0.2. Therefore, as $x \to 0$, $f(x)$ approaches multiple y values, which means that $\lim_{x \to 0} f(x)$ does not exist.

3. **Answer:** (c). The quantitites in (a) and (b) are determined by A and B, because of the sum and product limit laws, but the quotient limit law does not apply in (c) if $B = 0$. (And in fact, if $A = 0$ as well, we can choose f and g to get the value in (c) to be whatever we like.)

4. **Answer:** (c). If the numerator is 0 at $x = 3$, the limit is 0; if only the denominator is 0 at $x = 3$, the limit does not exist. The only ambiguous scenario is the so-called $\frac{0}{0}$ scenario, i.e., the case where both the numerator and denominator are 0 at $x = 3$. Of course, this is the most useful scenario, and the whole reason we bother to study limits in calculus in the first place.