Answers for class prep quiz on section 2.8, Stewart's Calculus (8th ed.)

1. **Answer:** (a). (a) is correct because a line with slope 0 is horizontal. (b) actually *can't* happen when $f'(4) = 0$ because if f has a derivative at $x = 4$, then f must be continuous at $x = 4$. (c) and (d) are both possible when $f'(4) = 0$, but aren't guaranteed just from knowing that $f'(4) = 0$.

2. **Answer:** (c). For $x < 0$, tangent lines to $y = g(x)$ have positive slopes, and for $x > 0$, tangent lines to $y = g(x)$ have negative slopes. Therefore, for $x < 0$, $g'(x) > 0$, and for $x > 0$, $g'(x) < 0$.

3. **Answer:** (c). Since we always have $h'(x) < 0$, the slopes of all tangent lines are negative. More subtly, since h' is *increasing*, h' is becoming *less negative*, which means that as x increases, the tangent lines get closer to being horizontal. This happens only in (c).

4. **Answer:** (a). (a) is not always true because we can have a function that is continuous at $x = 7$ but "pointy"/"jaggedy"/etc. at $x = 7$, and therefore, not differentiable at $x = 7$. (Example: $f(x) = |x-7|$.) For (b), (c), and (d), think of differentiability, continuity, and having a limit and a value as being properties of functions that represent decreasing levels of chocolate-y goodness (i.e., differentiable functions are the highest level of chocolate-y goodness, and having a limit and a value are the lowest). (b), (c), and (d) then come down to realizing that a high level of chocolate-y goodness implies a low-level version.