Derivatives review: True or False? Justify.

Side A

(1) If $a'(3) = 6$, then the derivative of $a(x)^2$ at $x = 3$ is 36. F

(2) The function $b(x) = |x^3|$ is differentiable at $x = 0$. T

(3) If $c(x)$ is a function and $c'(10) = 38$, then the derivative of $c(5x)$ at $x = 2$ is 38. F

(4) The function $d(x) = x^3 - 3x + 5$ has no maximum value on $(-4, -2)$. T

(5) If $e(x)$ is differentiable at $x = 2$ and $f(x)$ is differentiable at $x = 2$, then $(e \circ f)(x)$ is differentiable at $x = 2$. F

(6) If $g'(5) = -1$, then $g(5.001) < g(5)$. F

(7) If $h(x)$ has a local maximum at $x = 7$ (meaning that there is some $\delta > 0$ such that $h(7) \geq h(x)$ for all $x \in (7 - \delta, 7 + \delta)$) and h is differentiable at 7 then $h'(7) = 0$. T

(8) If $i'(7) = 0$ then $i(x)$ has a local maximum at $x = 7$ (meaning that there is some $\delta > 0$ such that $i(7) \geq i(x)$ for all $x \in (7 - \delta, 7 + \delta)$). F

(9) If $j'(5) = 0$, then there is some $\delta > 0$ such that $j(x) = j(5)$ for all $x \in (5 - \delta, 5 + \delta)$. F

(10) If $k(x)$ is increasing on the interval $(-3, 2)$, then k is differentiable on $(-3, 2)$ and $k'(x) \geq 0$ on $(-3, 2)$. F

(11) If $\ell(x)$ is continuous at $x = 0$, then $x^2\ell(x)$ is differentiable at $x = 0$. T

(12) If $m'(r) > 0$ and $m''(r)$ exists (meaning the function $m'(x)$ is differentiable at $x = r$), then m is increasing on some interval containing r. T

Derivatives review: True or False? Justify.

Side B

(1) If $a(3) = 0$ and $a'(3) = 6$, then the derivative of $x^2a(x)$ at $x = 3$ is 54. T

(2) The function $b(x) = |x^3 - x|$ is differentiable at $x = 0$. F

(3) The function $c(x) = -3x^5 + 4x^4 + 3x^2 - 6x$ is increasing on some open interval containing $x = 1$. T

(4) The function $d(x) = x^3 - 3x + 5$ has no maximum value on $[-4, -2]$. F

(5) If $e(x)$ is differentiable at $x = 2$ and $f(x)$ is differentiable at $x = 2$, then $(ef)(x)$ is differentiable at $x = 2$. T

(6) If $g'(5) = -1$, then $g(5.00\ldots01) < g(5)$ if there are enough zeroes in the middle. T

(7) If $h(x)$ has a local maximum at $x = 7$ (meaning that there is some $\delta > 0$ such that $h(7) \geq h(x)$ for all $x \in (7 - \delta, 7 + \delta)$), then $h'(7) = 0$. F

(8) If $j'(-1) = 1$ and $(i/j)(x)$ is not differentiable at $x = -1$, then $i(x)$ is not differentiable at $x = -1$. T

(9) If k is not increasing on some interval I then there is some subinterval $J \subseteq I$ such that k is strictly decreasing on J. F

(10) If $\ell(x)$ is defined at $x = 0$, then $x^2\ell(x)$ is differentiable at $x = 0$. F

(11) If $m'(r) = 0$ and $m''(r) < 0$, then $m(x)$ has a local maximum at $x = r$ (meaning that there is some $\delta > 0$ such that $m(r) \geq m(x)$ for all $x \in (r - \delta, r + \delta)$). T

(12) If $n(x)$ is continuous at $x = 2$, then $n(x)$ is differentiable at $x = 2$. F