5. Analytical Applications of Differentiation

Starter Quiz ·

AP Calculus AB Name: _____ Score: _____

1. The MVT on $[a, b]$ requires **which** hypotheses?

   ☐ f differentiable on (a, b)

   ☐ f continuous on $[a, b]$

   ☐ $f(a) = f(b)$

   ☐ f is a polynomial

   Tick every correct option.

2. A critical point is an interior x where...

   ☐ $f''(x) = 0$ only

   ☐ $f(x) = 0$

   ☐ $f(x)$ is largest

   ☐ $f'(x) = 0$ or $f'(x)$ does not exist

3. A function is increasing on an interval exactly when...

   ☐ $f(x) < 0$ there

   ☐ $f(x) > 0$ there

   ☐ $f''(x) > 0$ there

   ☐ $f'(x) > 0$ there

4. If f' changes from positive to negative at c, then f has a...

   ☐ inflection point

   ☐ vertical asymptote

   ☐ local maximum

   ☐ local minimum

5. To find absolute extrema on $[a, b]$, evaluate f at **which** points?

   ☐ every integer in $[a, b]$

   ☐ the endpoint b

   ☐ all critical points in $[a, b]$

   ☐ the endpoint a

   Tick every correct option.

6. If $f'(c) = 0$ and $f''(c) > 0$, then c is a...

☐ endpoint

☐ relative maximum

☐ relative minimum

☐ inflection point

7. Where the graph of f has a horizontal tangent, the graph of f'...

   ☐ is undefined

   ☐ is at a maximum

   ☐ crosses zero

   ☐ is negative

8. On an interval where the graph of f' is positive, f is increasing.

   ☐ True ☐ False

9. The goal of the setup is to write the objective in terms of a _____ variable.

   _____

10. A vertical tangent occurs where the _____ of $\frac{dy}{dx}$ is zero.

    _____

AP Calculus AB

1. **f differentiable on (a, b); f continuous on $[a, b]$**

   Continuous on the closed interval and differentiable on the open one. ($f(a) = f(b)$ is the extra Rolle condition.)

2. **$f'(x) = 0$ or $f'(x)$ does not exist**

   Critical points: $f' = 0$ or f' undefined.

3. **$f'(x) > 0$ there**

   Positive first derivative means increasing.

4. **local maximum**

   Up then down = the top of a hill = local max.

5. **the endpoint b; all critical points in $[a, b]$; the endpoint a**

   Critical points plus both endpoints – that is the full candidate list.

6. **relative minimum**

   Concave up at a flat spot = minimum.

7. **crosses zero**

   Horizontal tangent $\Rightarrow$ slope 0 $\Rightarrow$ $f' = 0$.

8. **True**

   $f' > 0 \Leftrightarrow f$ increasing.

9. **single**

   One variable $\Rightarrow$ an ordinary extremum problem.

10. **denominator**

    Denominator zero $\Rightarrow$ slope undefined $\Rightarrow$ vertical tangent.