1. Limit process to find derivatives is that long ugly method: $f'(x)=\lim_{\Delta x\to 0}\frac{f(x+\Delta x)-f(x)}{\Delta x}$

2. Understand continuity and differentiability of piecewise functions like: $f(x)=\begin{cases}3x-2, & \text{for } x\le 3\\ 2-x^2, & \text{for } x>3\end{cases}$

3. $y'=ky$ (*rate of change of y is proportional to y)* leads to $y=Ce^{kt}$.

4. Before you differentiate or integrate, rewrite the following type of functions:
$\sin^2 x=(\sin x)^2$, $\frac{3}{x^5}=3x^{-5}$, $\frac{x^3-4x^2}{x^3}=1-4x^{-1}$, $\sqrt[3]{(5x-4)^2}=(5x-4)^{2/3}$

5. Riemann sums: Left, Right, Midpoint, Trapezoid (Numerical Approximations). Each interval can be the same or change.

6. Knowing how to sketch f and f'' if you are given the graph or table of values for f'. Focus on all extrema and P of I.

7. Understand the relationships between position, velocity, and acceleration.
$a(t)=v'(t)=s''(t)$, Speed = |v(t)|, Total Distance = $\int_a^b |v(t)|\,dt$ and Position = Initial Position + $\int_a^b v(t)dt$.

8. 2nd Fund. Theorem of Calculus is the derivative of an integral. $\frac{d}{dx}\int_a^{x^3}\left(t^2-2t\right)dt=\left(\left(x^3\right)^2-2\left(x^3\right)\right)\left(3x^2\right)$

9. Remember: $\int_b^a f(t)dt=-\int_a^b f(t)dt$

10. Be careful not to integrate when you are supposed to derive and vice versa.

11. Remember: $\int\left(\sin(3x)+5x^2\right)dx = \int \sin(3x)dx + \int 5x^2 dx$

12. Remember with Washer Method that: $\pi\int_a^b\left((Outer)^2-(Inner)^2\right)dx$ not $\pi\int_a^b\left(Outer-Inner\right)^2 dx$

13. When you find the definite integral of a derivative (Rate) function, you are finding the total change (sum of the change) from a to b. $\int_a^b f'(x)dx = f(b)-f(a)$

14. Whenever you're asked where a function is decreasing, you are finding were the slope of that function is negative.

15. Be careful on chain problems with multiple steps.

16. Don't forget to include endpoints with your relative extrema, when you find absolute extrema.

17. Remember extrema and points of inflections are where the sign changes.

18. You MUST understand all the small details of every major concept.
    Ex: Differentiability implies continuity, but continuity does not imply differentiability.

19. Pay attention to the units of measure. They tell you if it is an initial function, it's derivative, or it's integral.

20. When finding the Average Value, the units of measure stay the same. $\frac{1}{b-a}\int_a^b f(t)dt$

21. Whenever you see the word rate of change, think derivative.

22. There will sometimes be data given that you do not even need to solve the problem.

23. Remember composite functions $f(g(x))$: If $f(x) = 3x^2 - 4x$ then $f(\sin x) = 3(\sin x)^2 - 4(\sin x)$

24. When you find the equation of a tangent line of $f(x)$, you need $(x, f(x))$ and $f'(x)$.

25. With Implicit Differentiation do not forget the Chain Rule. Every time you take the derivative of something with y, do not forget y'.

26. When you read “with respect to time”, think “relate rates”.

27. Absolute Extrema = Global Extrema and Relative Extrema = Local Extrema.

28. In order to best fit your graphs on your calculators, first adjust the domain(x-values) and then press ZoomFit.

29. Slope fields are easy, so do not forget to review them.