

## AP Calculus – Final Review Sheet

When you see the words ....

This is what you think of doing

1. Find the zeros	
2. Find equation of the line tangent to $f(x)$ at $(a,b)$	
3. Find equation of the line normal to $f(x)$ at $(a,b)$	
4. Show that $f(x)$ is even	
5. Show that $f(x)$ is odd	
6. Find the interval where $f(x)$ is increasing	
7. Find interval where the slope of $f(x)$ is increasing	
8. Find the minimum value of a function	
9. Find the minimum slope of a function	
10. Find critical values	
11. Find inflection points	
12. Show that $\lim_{x \rightarrow a} f(x)$ exists	
13. Show that $f(x)$ is continuous	
14. Find vertical asymptotes of $f(x)$	
15. Find horizontal asymptotes of $f(x)$	

16. Find the average rate of change of $f(x)$ on $[a, b]$	
17. Find instantaneous rate of change of $f(x)$ at a	
18. Find the average value of $f(x)$ on $[a, b]$	
19. Find the absolute maximum of $f(x)$ on $[a, b]$	
20. Show that a piecewise function is differentiable at the point $a$ where the function rule splits	
21. Given $s(t)$ (position function), find $v(t)$	
22. Given $v(t)$ , find how far a particle travels on $[t_1, t_2]$	
23. Find the average velocity of a particle on $[t_1, t_2]$	
24. Given $v(t)$ , determine if a particle is speeding up at $t = k$	
25. Given $v(t)$ and $s(0)$ , find $s(t)$	
26. Show that Rolle's Theorem holds on $[a, b]$	
27. Show that Mean Value Theorem holds on $[a, b]$	
28. Find domain of $f(x)$	
29. Find range of $f(x)$ on $[a, b]$	
30. Find range of $f(x)$ on $(-\infty, \infty)$	
31. Find $f'(x)$ by definition	

32. Find derivative of inverse to $f(x)$ at $x = a$	
33. $y$ is increasing proportionally to $y$	
34. Find the line $x = c$ that divides the area under $f(x)$ on $[a, b]$ to two equal areas	
35. $\frac{d}{dx} \int_a^x f(t) dt =$	
36. $\frac{d}{dx} \int_a^u f(t) dt$	
37. The rate of change of population is ...	
38. The line $y = mx + b$ is tangent to $f(x)$ at $(a, b)$	
39. Find area using left Riemann sums	
40. Find area using right Riemann sums	
41. Find area using midpoint rectangles	
42. Find area using trapezoids	
43. Solve the differential equation ...	
44. Meaning of $\int_a^x f(t) dt$	
45. Given a base, cross sections perpendicular to the $x$ -axis are squares	
46. Find where the tangent line to $f(x)$ is horizontal	
47. Find where the tangent line to $f(x)$ is vertical	
48. Find the minimum acceleration given $v(t)$	

49. Approximate the value of $f(0.1)$ by using the tangent line to $f$ at $x = 0$	
50. Given the value of $F(a)$ and the fact that the anti-derivative of $f$ is $F$ , find $F(b)$	
51. Find the derivative of $f(g(x))$	
52. Given $\int_a^b f(x)dx$ , find $\int_a^b [f(x)+k]dx$	
53. Given a picture of $f'(x)$ , find where $f(x)$ is increasing	
54. Given $v(t)$ and $s(0)$ , find the greatest distance from the origin of a particle on $[a, b]$	
55. Given a water tank with $g$ gallons initially being filled at the rate of $F(t)$ gallons/min and emptied at the rate of $E(t)$ gallons/min on $[t_1, t_2]$ , find	
56. a) the amount of water in the tank at $m$ minutes	
56. b) the rate the water amount is changing at $m$	
57. c) the time when the water is at a minimum	
58. Given a chart of $x$ and $f(x)$ on selected values between $a$ and $b$ , estimate $f'(c)$ where $c$ is between $a$ and $b$ .	
59. Given $\frac{dy}{dx}$ , draw a slope field	
60. Find the area between curves $f(x), g(x)$ on $[a, b]$	
61. Find the volume if the area between $f(x), g(x)$ is rotated about the $x$ -axis	
62. Find the interval that the velocity is increasing.	