AP Calculus BC – AP Exam Review Chart

	When you see this…	Do this…
1.	Find the zeros	
2.	Find where $f(x)=g(x)$	
3.	Find the equation of the line tangent to $f(x)$ at $x = a$	
4.	Find the equation of the line normal to $f(x)$ at $x = a$	
5.	Use the equation of the tangent line to $f(x)$ at $x = a$ to approximate $f(b)$	
6.	$\frac{d}{dx}\left(f(x)g(x)\right)=$	
7.	$\frac{d}{dx}\left(\frac{f(x)}{g(x)}\right)=$	
8.	$\frac{d}{dx}\left(f\left(g(x)\right)\right)=$	
9.	Find where the tangent line to $f(x)$ is horizontal/vertical	
10.	Find the interval(s) where $f(x)$ is increasing/decreasing	
11.	Find the interval(s) where the slope of $f(x)$ is increasing/decreasing	
12.	Find the interval(s) where $f(x)$ is concave up/down	
13.	Find the maximum/minimum values of $f(x)$ on $[a,b]$	
14.	Find critical points	
15.	Find and verify relative extrema – 1st deriv test	
16.	Find and verify relative extrema – 2nd deriv test	
17.	Find and verify inflection points	
18.	Show that $\lim_{x\to a} f(x)$ exists	

19.	Show that $f(x)$ is continuous	
20.	Show that $f(x)$ is differentiable (or not) at a given point	
21.	Find vertical asymptotes of $f(x)$	
22.	Find horizontal asymptotes of $f(x)$	
23.	Find the average rate of change of $f(x)$ on $[a,b]$	
24.	Find the instantaneous rate of change of $f(x)$ at $x = a$	
25.	Find the average value of $f(x)$ on $[a,b]$	
26.	Show that a piecewise function is continuous or differentiable at a point a (where the function splits)	
27.	Given a position function, find the velocity and acceleration functions	
28.	Find the displacement of a moving particle on the interval $[a,b]$	
29.	Find $x(t_2)$ given $x(t_1)$ and $v(t)$	
30.	Find the speed of the particle at a given value of t	
31.	Find the total distance traveled on $[a,b]$	
32.	Find the average velocity of the particle on $[a,b]$	
33.	Determine whether an object is speeding up/slowing down	
34.	Show that the Mean Value Theorem holds (or does not hold) on $[a,b]$ for a given function	
35.	Find the domain of $f(x)$	
36.	Find the range of $f(x)$	
37.	Find $f'(x)$ using the definition of the derivative	

38.	Find the derivative of the inverse of $f(x)$ at $x = a$	
39.	Given that the rate of change of y is proportional to y, find an expression for y	
40.	Find the line $x = c$ that divides the area under $f(x)$ on $[a,b]$ into two equal areas	
41.	$\int_a^b f'(x)dx =$	
42.	$\frac{d}{dx}\int_a^x f(t)dt =$	
43.	$\frac{d}{dx}\int_a^{g(x)} f(t)dt =$	
44.	$\frac{d}{dx}\int_{h(x)}^{g(x)} f(t)dt =$	
45.	Approximate $\int_a^b f(x)dx$ using 4 subintervals* and the given method x: 1, 3, 5, 7, 9 $f(x)$: 1, 13, 16, 5, 3 a. LRAM b. RRAM c. MRAM (*2 subintervals) d. TRAP	
46.	Given the table above, approximate $f'(3)$	
47.	Find the particular solution $y = f(x)$ to $\frac{dy}{dx} = ...$	
48.	Given a differential equation $\frac{dy}{dx} = f(x,y)$, draw a slope field and a particular solution through a given point	
49.	Given a differential equation $\frac{dy}{dx} = f(x,y)$, show that $y = f(x)$ is a solution.	
50.	Euler's Method: If $\frac{dy}{dx} = f(x,y)$ and (x_0, y_0) is a point on the solution curve, then $y_1 =$	

x	1	3	5	7	9
$f(x)$	1	13	16	5	3

51.	Find the area contained by two functions (with respect to x)	
52.	Find the area contained by two functions (with respect to y)	
53.	Find the volume of a solid with known cross-sectional area $A(x)$ whose base is the area under $f(x)$ on [a,b]	
54.	Find the volume if the area under $f(x)$ and above the x – axis from [a,b] is rotated about the: a. x – axis b. line $y = c$	
55.	Find the volume if the area between $f(x)$ and $g(x)$ is rotated about the: a. x – axis b. line $y = c$	
56.	Repeat #54 and #55 with functions with respect to y and rotating about the: a. y – axis b. line $x = c$	
57.	Find the length of a curve (function mode)	
58.	Find $f(b)$ given $f'(x)$ and $f(a)$	
59.	Given a graph of $f'(x)$, determine where $f(x)$ is: a. Increasing/decreasing b. Concave up/down Also determine relative extrema and points of inflection.	
60.	Integration by Parts: $\int udv =$ LIPET =	
61.	Partial Fractions (cover up) a. For what types of functions can it be used? b. What must be true about the denominator?	

62.	L'Hopital's Rule: for what indeterminate forms can it be used?	
63.	Improper Integrals: what makes an integral improper?	
64.	$\frac{dP}{dt}=\frac{k}{M}P(M-P)$ a. What does M stand for? b. What is $\lim_{t\to\infty} P(t)$ c. When is the population growing fastest?	
65.	Vectors: if $r(t)=\langle x(t),y(t)\rangle$, then: a. $v(t)=$ b. $a(t)=$ c. Speed = d. Total Distance traveled (arc length) on [a,b]= e. $\frac{dy}{dx}=$ f. $\frac{d^2y}{dx^2}=$ g. Object at rest if…	
66.	Find the area contained by a polar curve	
67.	Converting Cartesian to polar: a. $x=$ b. $y=$	
68.	Slope in polar: $\frac{dy}{dx}=$	
69.	Find the length of a polar curve	
70.	Determine the convergence/divergence of a series using; a. Divergence test b. Integral test c. P-series test d. Geometric series test e. Ratio test	

71.	Find the interval/radius of convergence of a series	
72.	Write the Taylor series about $x = a$	
73.	Write the Maclaurin series for a. $\sin x$ b. $\cos x$ c. e^x d. $\frac{1}{1-x}$ e. $\frac{1}{1+x}$ f. $\tan^{-1} x$	
74.	Write a series for each of the following (using known series): a. $\frac{\cos(3x)+1}{x}$ b. $\frac{e^{-x^2}}{x}$	
75.	If $f(x)=2+6x+18x^2+\cdots$, find $f\left(\frac{1}{6}\right)$	
76.	Suppose $f^{(n)}(a)=\frac{(n+1)n!}{2^n}$ for $n\geq 1$ and $f(a)=2$. Write the first four terms and the general term of the Taylor series for $f(x)$ about $x = a$.	
77.	Let S_4 be the sum of the first 4 terms of a converging alternating series that approximates $f(x)$. Approximate $\left\|f(x)-S_4\right\|$	
78.	What are the properties of a series that guarantee that the error in approximating $f(x)$ using S_n is less than or equal to a_{n+1}?	
79.	Given a Taylor series, find the Lagrange form of the remainder for the 4th term	