AP Calculus AB – Worksheet 21 **Limit Definition of the Derivative and the Tangent Line Problem**

Find the derivative of the function using the limit process.

Remember: The derivative is a new function so it requires new notation; Example: $f'(x)$ or $\frac{dy}{dx}$ or y'

1	$g(x)=-5$
2	$h(s)=3+\frac{2}{3}s$

Find the slope of the tangent line to the graph of the function at the given point.

3	$f(t)=3t-t^2;\quad (1,2)$

Find the equation of the tangent line to the graph of the function at the given value of x.

4	$f(x)=x^2+2x+1,\ x=-4$

5	What is the value of k if $f(x)=\begin{cases}2kx^2-x, & x<3\\ x^3+x, & x\geq 3\end{cases}$ is everywhere continuous?

The table below shows selected values for a function, $f(x)$, at various values of x.

x	0	1	2	5	9
$f(x)$	14	18	24	32	44

6) Find the average rate of change of the function over the interval $[1,2]$.

7) Find the average rate of change of the function over the interval $[5,9]$.

8) Estimate the slope of the function when $x=3$.