

# AP CALCULUS AB – QUIZ #7 STUDY GUIDE

1) For

$$f(x) = \frac{x}{x^2 + 4},$$

- a) calculate  $f'(x)$  and  $f''(x)$
- b) find the  $(x, y)$  coordinates of all relative and absolute extrema. Include a sketch of  $y = f(x)$ .
- c) find the  $(x, y)$  coordinates of all inflection points.

Justify your answers to part **b** in terms of values of  $f(x)$ ,  $f'(x)$  and/or  $f''(x)$ .

2) Consider the function

$$f(x) = \begin{cases} \frac{1}{2}x^3 - \frac{49}{8}x^2 + 21x - \frac{107}{8} & , \quad 0 \leq x \leq 7 \\ -\frac{5}{8}x^2 + \frac{23}{2}x - \frac{359}{8} & , \quad 7 < x \leq 12 \end{cases}.$$

- a) Is  $f(x)$  continuous at  $x = 7$ ?
- b) Is  $f(x)$  differentiable at  $x = 7$ ?
- c) Does  $x = 7$  correspond to an extremum?
- d) Calculate  $f'(x)$  and  $f''(x)$ .
- e) Find the  $(x, y)$  coordinates of all relative and absolute extrema. Justify your answers in terms of values of  $f(x)$ ,  $f'(x)$  and/or  $f''(x)$ . Be sure to check the endpoints of the domain of interest.
- f) Find the  $(x, y)$  coordinates of any inflection points using values of  $f''(x)$ . Be sure also to check the point at  $x = 7$ .

3) Sketch a function  $y = f(x)$  which has the characteristics given in the table.

	$x = 0$	$x \in [0, 2)$	$x = 2$	$x \in (2, 4)$	$x = 4$	$x \in (4, 6)$	$x = 6$	$x \in (6, 8]$	$x = 8$
$f(x)$	6		3		6		7		5
$f'(x)$	-4	-	0	+	D.N.E.	+	0	-	-2
$f''(x)$	+	+	+	+	D.N.E.	-	-	-	-