AP Calculus AB — Chapter 5 Review 1

Name:_____ Per:_____ Date:_____

1. If the derivative of the function is given by $f'(x) = 2\cos\left(x - \frac{\pi}{6}\right) + 1$ on $[-2\pi, 2\pi]$, find the following.

A. Sketch a graph of $f'(x)$.	
B. On what interval(s) is $f(x)$ increasing?	**C.** On what interval(s) is $f(x)$ decreasing?
D. On what interval(s) is $f(x)$ concave up?	**E.** On what interval(s) is $f(x)$ concave down?
F. Where are any relative maximums?	**G.** Where are any relative minimums?
H. Where are in point(s) of inflection?	

2. If $x(t) = t^2 - 8t + 12$ is a position of a particle moving along the *x*-axis at time *t*, find the following.

A. Find the average velocity for the first 3 seconds.	**B.** Find the velocity at $t = 4$ seconds.
C. When is the object stopped?	**D.** When is the acceleration of the object 0?
E. When does the object change direction?	**F.** When does the object slow down?
G. When is the object moving left?	

3. The function *f* is defined by $g(x) = x^3 + ax$ where *a* is a constant. If the line tangent to the graph of *g* at $x = -1$ is perpendicular to the line that contains the points (–5, 3) and (3, 5), what is the value of *a*?

4. $\lim\limits_{x \to e} \dfrac{\left(x^{20} - 3x\right) - \left(e^{20} - 3e\right)}{x - e}$ is

5. $\lim\limits_{h \to 0} \dfrac{\sin\left(\frac{\pi}{6} + h\right) - \frac{1}{2}}{h} =$

6. The function *f* is defined by $f(x) = x^3 + 2x - 1$. If *g* is the inverse function of *f* and $g(2) = 1$, what is the value of $g'(2)$?

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
–2	–6	4	1	16
1	5	–3	3	–2
3	0	7	8	3

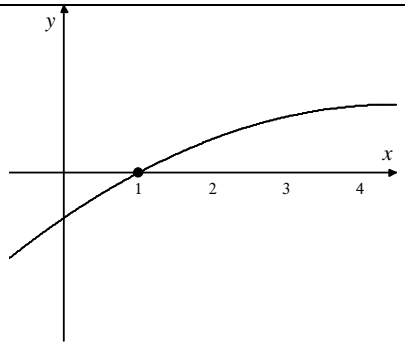
7. The table above gives values of f, f', g, and g' for selected values of *x*. If $h(x) = f\left(g(x)\right)$, what is the value of $h'(-2)$?

8. The second derivative of a function f is given by $f''(x) = \cos(2x) - \sin(x^2)$. How many points of inflection does the graph of f have on the interval $0 < x < 5$?

9. Name the different types of discontinuities. Graphical give an example of each type.

10. The velocity of a particle moving along the x-axis is given by $v(t) = \ln(x^2) - \sin(x^2)$ for $t > 0$.

A. Describe the velocity and acceleration at time $t = 1$ and $t = 3$.
B. Find the first instance velocity is zero.
C. Find the first instance acceleration is zero.



11. The graph of a twice-differentiable function f is shown in the figure above. Relate $f(1)$, $f'(1)$, and $f''(1)$ with each other (positive, negative, zero).

12. Let f be a continous function on the closed interval $[0, 4]$ with $f(0) = 9$ and $f(4) = 1$.

A. Does f have an absolute maximum or minimum value? Explain your answer.
B. Is there a number c in the open interval $(0, 4)$ where $f'(c) = -2$? Justify your answer.
C. Does f have any horiztontal tangents on the open interval $(0, 4)$? Why or why not?
D. Is f decreasing on the closed interval $[0, 4]$? Why or why not?

x	–1	0	1	2	3
$f(x)$	9	8	5	0	–7

13. Let f be a twice-differnetiable funcion on the interval $-1 \le x \le 3$. Selected values of x are shown in the table above.

A. Is f' increasing or decreasing for $-1 \le x \le 3$? Explain your answer.
B. Is f'' increasing or decreasing for $-1 \le x \le 3$? Explain your answer.
C. Is f concave up or concave down for $-1 \le x \le 3$? Explain your answer.