AP Calculus AB **Name:**
Quarter 3 Cumulative Review

Recall The Fundamental Theorem of Calculus:

If $g(x)=\int_a^x f(t)dt$, then $\int_a^b f(t)dt = g(b)-g(a)$ and $g'(u)= f(u)\cdot du$.

1. Let $g(x)=\int_{-7}^{8x^2+4} f(t)dt$. Find $g'(x)$.

2. Let $g(x)=\int_{\ln x}^{\cos 3x} f(t)dt$. Find $g'(x)$.

3. The function $g(x)=\dfrac{x^2}{e^x}$ has the derivative $g'(x)=\dfrac{x(2-x)}{e^x}$. Find the exact value of $\int_1^4 \dfrac{x(2-x)}{e^x}dx$.

4. If *f* is the function defined by $f(x)=\sqrt[3]{\cos 5x}$ and *g* is an antiderivative of *f* such that $g(2)=5$, then use a calculator to approximate $g(6)$.

5. If *f* is the function defined by $f(x)=\dfrac{1}{5x^2+3}$ and *g* is an antiderivative of *f* such that $g(3)=11$, then use a calculator to approximate $g(1)$.

6. Let f and h be twice differentiable functions.

x	0	1	2	3	4	5	6	7	8	9
$f(x)$	0	3	4	-2	8	1	0	4	1	7
$f'(x)$	-2	-3	-4	-5	-6	2	-2	3	23	-2
$h(x)$	1	2	1	4	10	5	-4	2	3	4
$h'(x)$	5	4	3	2	1	6	-6	1	4	8

a. Evaluate $\int_1^3 h'(x)dx$.

b. Let $a(x) = f(2x)$.

i. What is $a'(x)$?

ii. Evaluate $\int_1^3 a'(x)dx$.

iii. Evaluate $\int_1^3 f'(2x)dx$

c. Let $b(x) = f(h(x))$.

i. What is $b'(x)$?

ii. Evaluate $\int_1^3 b'(x)dx$.

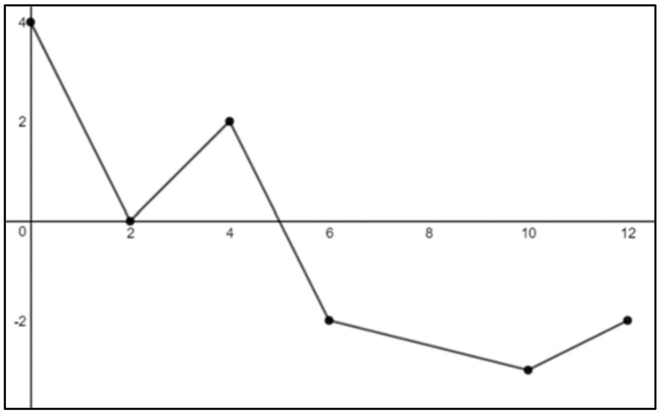
iii. Evaluate $\int_2^5 f'(h(x)) \cdot h'(x)dx$

d. Let $m(x) = \int_{-3}^{e^{2x}} f(t)dt$.

i. What is $m'(x)$?

ii. Find $m'(0)$.

7. The graph below is *f(x)*. Let $g(x)=\int_0^x f(t)dt$.



a. Calculate *g(0), g(2)*, and *g(10)*.

b. Make a sign chart for *g'(x)* and *g''(x)*.

c. Where is *g(x)* increasing? Justify your response.

d. Where is *g(x)* decreasing? Justify your response.

e. Where is *g(x)* concave up? Justify your response.

f. Where is *g(x)* concave down? Justify your response.

g. Where does *g(x)* have points of inflection? Justify your response.

h. Where does *g(x)* have local minima? Justify your response.

i. Where does *g(x)* have local maxima? Justify your response.

j. What is the minimum value of *g(x)*? Justify your response.

k. What is the maximum value of *g(x)*?

l. What is *g(0)* if $g(x)=\int_6^x f(t)dt$?