Lesson 85/86 for 2020 AP Exam- Start +Accumulation

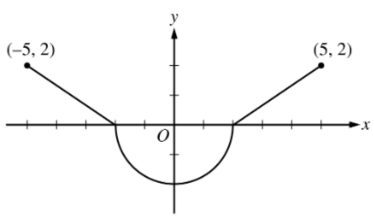
The 2020 AP Exam may contain some start + accumulation questions as the start + accumulation formula is just an application of the 1st fundamental theorem.

1st Fundamental Theorem	Start + Accumulation Formula *(Just add $f(a)$ to the other side)*
$$f(b) - f(a) = \int_a^b f'(x)dx$$	$$f(b) = f(a) + \int_a^b f'(x)dx$$ start + accumulation

Questions that may be asked will not have an applied context, which means they will not be questions with real-life scenarios. Most of the examples from the Lesson 85/86 video lesson were real-life scenarios (particle motion, temperature, water level of a lake, etc.), so below are some sample problems of ways in which you could be assessed on Lesson 85/86 for the 2020 AP Test. Answers are on the very last page.

Noncalculator Questions:

1.



Graph of f'

The graph of f', the derivative of a function f, consists of two line segments and a semicircle, as shown in the figure above. If $f(2) = 1$, then $f(-5) =$

(A) $2\pi - 2$

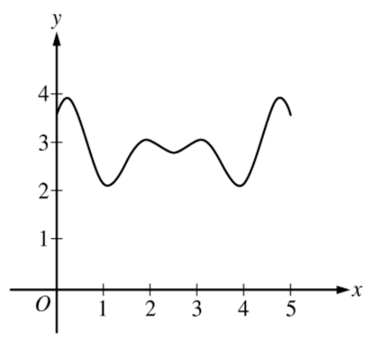
(B) $2\pi - 3$

(C) $2\pi - 5$

(D) $6 - 2\pi$

(E) $4 - 2\pi$

2.



Graph of f'

The graph of f', the derivative of f, is shown in the figure above. If $f(0) = 20$, which of the following could be the value of $f(5)$?

(A) 15

(B) 20

(C) 25

(D) 35

(E) 40

3.

If $G(x)$ is an antiderivative for $f(x)$ and $G(2) = -7$, then $G(4) =$

(A) $f'(4)$

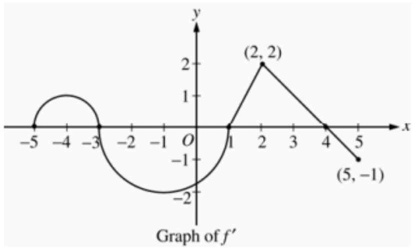
(B) $-7 + f'(4)$

(C) $\int_2^4 f(t)\ dt$

(D) $\int_2^4 (-7 + f(t))\ dt$

(E) $-7 + \int_2^4 f(t)\ dt$

4.



Let *f* be a function defined on the closed interval $-5 \le x \le 5$ with *f*(1)=3. The graph of *f'* the derivative of *f*, consists of two semicircles and two line segments, as shown above.

Find the absolute minimum value of *f*(*x*) over the closed interval $-5 \le x \le 5$. Explain your reasoning.

Calculator Questions:

5.

If the function *f* is defined by $f(x) = \sqrt{x^3 + 2}$ and *g* is an antiderivative of *f* such that *g*(3) = 5, then *g*(1) =

- A -3.268
- B -1.585
- C 1.732
- D 6.585
- E 11.585

6.

Let *F(x)* be an antiderivative of $\frac{(\ln x)^3}{x}$. If *F*(1)=0, then *F*(9)

- A 0.048
- B 0.144
- C 5.827
- D 23.308
- E 1,640.250

7. If $f'(x) = \sin\left(\frac{\pi e^x}{2}\right)$ and $f(0) = 1$, then $f(2) =$

Answers:

1. A
2. D
3. E
4.

The student response earns all of the following points:

1 point is earned if identifies x=1 as a candidate

1 point is earned if considers endpoint

1 point is earned for value and explanation

Candidates for the absolute minimum are where f changes from negative to positive (at x=1) and at the endpoints (x=-5,5).

$$f(-5) = 3 + \int_1^{-5} f(x)dx = 3 - \tfrac{\pi}{2} + 2\pi > 3$$
$$f(1) = 3$$
$$f(5) = 3 + \int_1^{5} f'(x)dx = 3 + \tfrac{3\cdot 2}{2} - \tfrac{1}{2} > 3$$

The absolute minimum value of f on [-5, 5] is f(1)=3.

5. B
6. C
7. 1.157