Classroom Voting Questions: Calculus II

Section 5.4 Theorems About Definite Integrals

1. The graph shows the derivative of a function $f$. If $f(0) = 3$, what is $f(2)$?

   (a) 2  
   (b) 4  
   (c) 7  
   (d) None of the above

2. The graph shows the derivative of a function $f$. Which is greater?

   (a) $f(2) - f(0)$  
   (b) $f(3) - f(1)$  
   (c) $f(4) - f(2)$

3. Suppose $f$ is a differentiable function. Then $\int_0^5 f'(t)dt = f(5)$

   (a) Always
4. If $f$ is continuous and $f(x) < 0$ for all $x$ in $[a, b]$, then $\int_a^b f(x)dx$

(a) must be negative
(b) might be 0
(c) not enough information

5. Let $f$ be a continuous function on the interval $[a, b]$. True or False: There exist two constants $m$ and $M$, such that

$$m(b - a) \leq \int_a^b f(x)dx \leq M(b - a).$$

(a) True, and I am very confident
(b) True, but I am not very confident
(c) False, but I am not very confident
(d) False, and I am very confident

6. You are traveling with velocity $v(t)$ that varies continuously over the interval $[a, b]$ and your position at time $t$ is given by $s(t)$. Which of the following represent your average velocity for that time interval:

I. \[ \frac{\int_a^b v(t)dt}{b - a} \]

II. \[ \frac{s(b) - s(a)}{b - a} \]

III. $v(c)$ for at least one $c$ between $a$ and $b$

(a) I, II, and III
(b) I only
(c) I and II only
(d) II only
(e) II and III only
7. **True or False:** \( \int_0^2 f(x)dx = \int_0^2 f(t)dt \)
   
   (a) True, and I am very confident
   (b) True, but I am not very confident
   (c) False, but I am not very confident
   (d) False, and I am very confident

8. **True or False:** If \( a = b \) then \( \int_a^b f(x)dx = 0 \).
   
   (a) True, and I am very confident
   (b) True, but I am not very confident
   (c) False, but I am not very confident
   (d) False, and I am very confident

9. **True or False:** If \( a \neq b \) then \( \int_a^b f(x)dx \neq 0 \).
   
   (a) True, and I am very confident
   (b) True, but I am not very confident
   (c) False, but I am not very confident
   (d) False, and I am very confident

10. **True or False:** If \( a \neq b \) and if \( \int_a^b f(x)dx = 0 \), then \( f(x) = 0 \).
    
    (a) True, and I am very confident
    (b) True, but I am not very confident
    (c) False, but I am not very confident
    (d) False, and I am very confident

11. **True or False:** If \( a \neq b \) and if \( \int_a^b |f(x)|dx = 0 \), then \( f(x) = 0 \).
    
    (a) True, and I am very confident
    (b) True, but I am not very confident
    (c) False, but I am not very confident
    (d) False, and I am very confident
12. **True or False:** If \( \int_0^2 f(x)\,dx = 3 \) and \( \int_2^4 f(x)\,dx = 5 \), then \( \int_0^4 f(x)\,dx = 8 \).

(a) True, and I am very confident  
(b) True, but I am not very confident  
(c) False, but I am not very confident  
(d) False, and I am very confident

13. Given that \( \int_0^2 f(x)\,dx = 3 \) and \( \int_2^4 f(x)\,dx = 5 \), what is \( \int_2^0 f(2x)\,dx \)?

(a) \( \frac{3}{2} \)  
(b) 3  
(c) 4  
(d) 6  
(e) 8  
(f) Cannot be determined

14. **True or False:** If \( \int_0^2 (f(x) + g(x))\,dx = 10 \) and \( \int_0^2 f(x)\,dx = 3 \), then \( \int_0^2 g(x)\,dx = 7 \).

(a) True, and I am very confident  
(b) True, but I am not very confident  
(c) False, but I am not very confident  
(d) False, and I am very confident

15. **True or False:** \( \int_1^2 f(x)\,dx + \int_2^3 g(x)\,dx = \int_1^3 (f(x) + g(x))\,dx \).

(a) True, and I am very confident  
(b) True, but I am not very confident  
(c) False, but I am not very confident  
(d) False, and I am very confident

16. **True or False:** If \( f(x) \leq g(x) \) for \( 2 \leq x \leq 6 \), then \( \int_2^6 f(x)\,dx \leq \int_2^6 g(x)\,dx \).

(a) True, and I am very confident  
(b) True, but I am not very confident  
(c) False, but I am not very confident  
(d) False, and I am very confident
17. **True or False:** If \( \int_{2}^{6} f(x) \, dx \leq \int_{2}^{6} g(x) \, dx \), then \( f(x) \leq g(x) \) for \( 2 \leq x \leq 6 \).

(a) True, and I am very confident
(b) True, but I am not very confident
(c) False, but I am not very confident
(d) False, and I am very confident