Classroom Voting Questions: Calculus II

Section 6.2 Constructing Antiderivatives Analytically

1. **True or False:** If \( f \) is continuous on the interval \([a, b]\), then \( \int_a^b f(x) \, dx \) is a number (rather than a function).
   
   (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

2. \( \int (x^3 + 5) \, dx = \)
   
   (a) \( 3x^2 \)
   (b) \( 3x^2 + 5 \)
   (c) \( \frac{x^4}{4} + 5 \)
   (d) \( \frac{1}{4}x^4 + 5x \)
   (e) None of the above

3. \( \int \sin x \, dx = \)
   
   (a) \( \sin x + C \)
   (b) \( \cos x + C \)
   (c) \( -\sin x + C \)
   (d) \( -\cos x + C \)
   (e) None of the above

4. \( \int x \sin x \, dx = \)
   
   (a) \( \cos x + C \)
   (b) \( \frac{1}{3}x^2 (\cos x) + C \)
   (c) \( x \cos x + C \)
   (d) \( \frac{1}{3}x^2 \sin x + C \)
   (e) Cant do with what we know right now
5. \[ \int 5e^x \, dx = \]
   (a) \( 5e^x + C \)
   (b) \( e^x + C \)
   (c) \( 5xe^x + C \)
   (d) \( \frac{5e^{x+1}}{x+1} + C \)
   (e) None of the above

6. \[ \int \sqrt{x} \, dx = \]
   (a) \( \frac{1}{2}x^{-1/2} + C \)
   (b) \( \frac{2}{3}x^{3/2} + C \)
   (c) \( \frac{4}{5}x^{5/2} + C \)
   (d) \( \frac{2}{3}x^{2/3} + C \)
   (e) Can’t do with what we know right now

7. \[ \int \sqrt{x^3} \, dx = \]
   (a) \( x^{3/2} + C \)
   (b) \( \frac{5}{2}x^{5/2} + C \)
   (c) \( \frac{3}{2}x^{1/2} + C \)
   (d) \( \frac{2}{3}x^{5/2} + C \)
   (e) \( \frac{3}{5}x^{5/3} + C \)
   (f) None of the above

8. \[ \int \frac{7}{x^2} \, dx = \]
   (a) \( -\frac{7}{x} + C \)
   (b) \( 7x^{-5} + C \)
   (c) \( -\frac{7}{6x^6} + C \)
   (d) \( \frac{7}{4x^4} + C \)
   (e) None of the above

9. What is \( \int_1^5 3 \, dt? \)
   (a) 3
10. What is $\int \frac{5}{x^2} \, dx$?
   (a) $-\frac{5}{x} + C$
   (b) $\frac{5}{x^2} + C$
   (c) $-\frac{10}{x} + C$
   (d) $\frac{30}{x^4} + C$

11. $\int \frac{3}{x} \, dx =$
   (a) $-\frac{3}{2}x^{-2} + C$
   (b) $3 \ln x + C$
   (c) $\frac{3}{x} + C$
   (d) $3x^{-1} + C$
   (e) None of the above

12. An antiderivative of $6x^2$ is
   (a) $2x^3$
   (b) $2x^3 + 5$
   (c) $2x^3 + 18$
   (d) $2x^3 - 6$
   (e) All of the above

13. Which of the following is an antiderivative of $y(x) = 3 \sin(x) + 7$?
   (a) $g(x) = 3 \cos(x)$
   (b) $g(x) = 3 \cos(x) + 7$
   (c) $g(x) = 3 \cos(x) + 7x$
   (d) $g(x) = -3 \cos(x) + 7x$
14. **True or False:** If $F(x)$ is an antiderivative of $f(x)$ and $G(x) = F(x) + 2$, then $G(x)$ is an antiderivative of $f(x)$.

(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. Water is flowing out of a reservoir at a rate given by $f(t) = 5000 + 50t + 5t^2$, where $t$ is in days and $f$ is in gallons per day. How much water flows out of the reservoir during the first week?

(a) 572 gallons  
(b) 5,000 gallons  
(c) 5,595 gallons  
(d) 35,000 gallons  
(e) 36,797 gallons  
(f) None of the above

16. Trucks are driving over a bridge at a rate given by the function $b(t) = 30 \cos(t) + 70$, where $t$ is in hours from noon and $b$ is in trucks per hour. How many trucks drive across the bridge between 3pm and 6pm?

(a) 13 trucks  
(b) 210 trucks  
(c) 197 trucks  
(d) 269 trucks

17. We know that $\frac{dy}{dx} = x^2$ and that $x(1) = 4$. What is the function $y(x)$?

(a) $y = \frac{1}{3}x^3$  
(b) $y = \frac{1}{3}x^3 + 3\frac{2}{3}$  
(c) $y = \frac{1}{3}x^3 + 4$  
(d) $y = x^2 + 3$  
(e) None of the above