General Calculus Practice

Choose one answer per question. Circle A, B, C, or D.

1. As x approaches 1 from either side, the graph approaches y = -2. A filled point at (1, 4) gives the actual function value there. What is the limit as x approaches 1?
   A. -2
   B. 4
   C. 1
   D. The limit does not exist

2. The graph of f passes through (4, 8). Its tangent line at that point rises 3 units for every 1 unit to the right. What is f'(4)?
   A. 1/3
   B. 8
   C. 3
   D. -3

3. If f(x) = 5x^3 - 7x + 4, what is f'(x)?
   A. 15x^2 - 7x
   B. 15x^2 - 7
   C. 5x^2 - 7
   D. 15x^2 - 3

4. The graph of f is horizontal at y = 3 from x = 2 to x = 7. What is the definite integral of f from 2 to 7?
   A. 5
   B. 9
   C. 21
   D. 15

5. What is the limit of x^2 + 3x - 2 as x approaches -2?
   A. 8
   B. -4
   C. -2
   D. 0

6. What is the limit of (x^2 - 2x - 15)/(x - 5) as x approaches 5?

A. 8
B. 2
C. 0
D. The limit does not exist

7. For f(x) = (2x - 1)^3, what is f'(3)?

A. 125
B. 75
C. 30
D. 150

8. A differentiable function has f'(x) > 0 just left of x = 4, f'(4) = 0, and f'(x) < 0 just right of x = 4. What does its graph have at x = 4?

A. A corner
B. A local minimum
C. A local maximum
D. A point where it increases through x = 4

9. What is the definite integral of 2x + 3 from x = 1 to x = 4?

A. 24
B. 28
C. 15
D. 21

10. Which expression gives all antiderivatives of 12x^2 - 4, where C is an arbitrary constant?

A. 24x + C
B. 4x^3 - 4 + C
C. 12x^3 - 4x + C
D. 4x^3 - 4x + C

11. A graph's tangent slopes are negative throughout an interval, and those slopes increase as x increases. Which description fits the graph on that interval?

A. Increasing and concave up
B. Decreasing and concave down
C. Decreasing and concave up
D. Increasing and concave down

12. A cart's position is s(t) = 2t^3 - 9t^2 + 12t meters for t from 0 to 3 seconds. During which open interval is the cart moving toward smaller positions?

A. Between 0 and 1 seconds
B. Between 1 and 2 seconds
C. Between 2 and 3 seconds
D. Throughout the interval between 0 and 3 seconds

13. A tank starts with 10 liters and has no outflow. Its inflow rate falls linearly from 6 to 2 liters per second over the first 4 seconds, then stays at 2 through second 7. How much water is in the tank at second 7?

A. 38 liters
B. 22 liters
C. 28 liters
D. 32 liters

14. Suppose f'(4) = 7. What is the limit of [f(4 + 3h) - f(4)] / h as h approaches 0?

A. 21
B. 7
C. 7/3
D. 0

15. For f(x) = x^2 - 4 on [0, 3], what are the definite integral and the total geometric area between the curve and the x-axis, in that order?

A. -3 and 7/3
B. 3 and 23/3
C. -3 and 23/3
D. 23/3 and 3