

Calculus AB Unit 5 Review

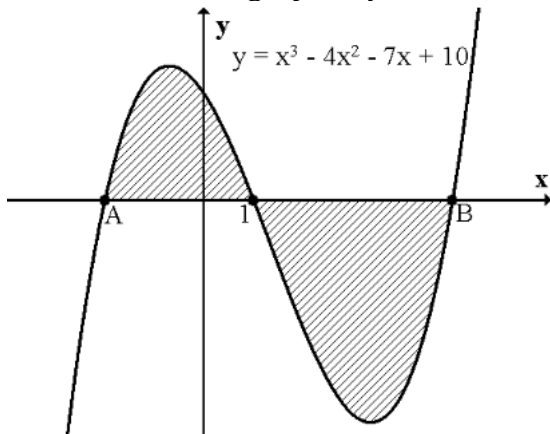
1. The volume V of the cylinder is increasing at the rate of 30π cubic meters per second. At the instant when the radius r of the cylinder is 2 meters, its volume is 12π cubic meters and the radius is increasing at $1/3$ meter per second.

- A) State the Given and the Equations needed for parts B, C, and D
- B) At the instant when the radius of the cylinder is 2 meters, what is the rate of Change of the area of the base. Place correct units after solution.
- C) At the instant when the radius of the cylinder is 2 meters. What is the rate of Change of its height, h . Place correct units after solution.
- D) At the instant when the radius of the cylinder is 2 meters, what is the Instantaneous rate of change of the area of its base with respect to its height, h .

2. $f(x) = ax^3 + bx^2 + cx + d$
 f has a relative maximum at the point $(2, 4)$.
 f has a point of inflection at the origin $(0, 0)$

- A) Find a
- B) Find b
- C) Find c
- D) Find d
- E) State the function f with the values for a , b , c , and d substituted in
- F) Sketch f from the information above

3. Consider the graph of $y = x^3 - 4x^2 - 7x + 10$ shown below.



- A) Solve for the values of A and B in the graph.
- B) Approximate the area under the curve of the function on $[A, 1]$ using a Left-Hand Riemann sum with 6 rectangles.
- C) Approximate the area under the curve of the function on $[1, B]$ using a Right-Hand Riemann sum with 4 rectangles.
- D) Find the actual area under the curve of the function from A to B.

4. A) $\int_{-4}^3 |x - 1| dx$

B) $\int_{-5}^0 |2x + 8| dx$

C) $\int_{\frac{3\pi}{6}}^{\frac{7\pi}{6}} \cos x dx$

D) $\int_2^3 \frac{x}{\sqrt{2x^2 - 5}} dx$

E) $f(x) = \begin{cases} 2x + 3, & \text{if } x \geq 1 \\ 5x^2, & \text{if } x < 1 \end{cases}$
Find \int_0^3

F) $\int_{\pi/2}^{\pi} 6 \sin\left(\frac{x}{2}\right) dx$

5. Let f be the function that is defined for all real numbers x that has the following properties:

1. $f(2) = 1$
2. $f'(-1) = 2$
3. $f''(x) = 12x - 6$

A) Write expression for $f'(x)$ for all x

B) Write expression for $f(x)$ for all x

C) $\frac{d}{dx} \int_0^x 12t - 6 dt$

D) $\frac{d}{dx} \int_1^{3x} 2t^2 - 4t dt$

6. A particle moves along the x -axis so its velocity at any time $t \geq 0$ is given by

$$v(t) = 2t^2 + 4t - 48$$

A) Find acceleration, $a(t)$

B) Find all values of t for which the particles is at rest

C) Find the position, $s(t)$, if $s(0) = -1$

D) Find the average value of $s(t)$, that satisfies the average value Theorem on $[1, 3]$

E) When is the particle moving to the right?

F) What is the furthest left that the particle travels?