I. 

1. Consider the integral \( \int_1^5 x^2 + 1 \, dx \) Evaluate the integral by dividing the interval into 4 equal subintervals and approximate the integral by a sum.

2. For \( f(x) = \cos(x) \) on \([0, \frac{\pi}{2}]\), dividing the interval into 4 equal subintervals and approximate the integral by a sum.

3. Given that \( f'(x) = 3x - 4 \) and that \( f(0) = 3 \). Find \( f(x) \).

4. Find the solution of \( y' = 2x + 3 \) satisfying \( y = 2 \) when \( x = 0 \)

II. Integrate each of the following:

5. \( \int_2^3 \frac{2}{(x)^2} \, dx \) is:

6. \( \int (4x^2 - 2)^{4} 8x \, dx \) is:

7. \( \int \frac{x^3 + 6}{x} \, dx \). 
   Hint: divide out.

8. \( \int_1^6 \sqrt{x} \, dx \)

9. \( \int \frac{dx}{(x+4)^2} \)

10. \( \int_3^1 x \sqrt{x^2 - 1} \, dx \)

11. \( \int_0^\frac{1}{3} \cos(\pi x) \, dx \)

12. \( \int \sin^2(x) \cos(x) \, dx \)

13. \( \int \frac{x^3 + 7x^2 + 5}{x^2} \, dx \)

14. \( \int_0^1 \frac{3x}{\sqrt{(0x^2+1)}} \, dx \)

15. \( D_x \int_0^x \sqrt{t^2 + 1} \, dt \)

16. \( D_x \int_0^{\sin(x)} \sqrt{t^4 + 1} \, dt \)

III. 

17. Find the area bounded by the \( y - \text{axis} \), and \( y = x^2 - 1 \) and \( x - \text{axis} \).

18. The area of the region bounded by the graphs of \( y = \sqrt{x}, \ x = 0 \), and \( y = 2 \).

19. Find the area bounded by the curves \( y = 4x \) and \( y = x^2 - 1 \) and the \( y\)-axis.

20. A ball is thrown vertically into the air from a height of 160 feet above the ground and with an initial velocity of 48 ft/sec. Find the details of this flight. e.g. max ht, speed upon impact.

**WE MAY NOT GET THIS FAR**

21. The volume of the solid generated by revolving about the \( x\)-axis the region bounded by the graphs of \( y = x \), \( y = 0 \), and \( x = 2 \) is described by

22. Find the volume of the solid generated by revolving about the \( y\)-axis the region bounded by the graphs of \( y = x^2 \) and \( y = 2x \).