Find the indefinite integral.

1. $\int \frac{x^3 - 2}{x^2} dx$
2. $\int 2\sqrt{x} - \frac{1}{\sqrt{x}} dx$
3. $\int \frac{x^3}{(x^4 - 5)^{1/3}} dx$
4. $\int \tan^2 x \sec^2 x dx$
5. $\int \frac{\cos x}{\sin^5 x} dx$
6. $\int x \cos x^2 dx$
7. Find f(x) given the following information :
   $f''(x) = x^2 - x \quad f'(1) = 2 \quad f(1) = 3$
8. If a runner moves forward with velocity $v(t) = 6t^2 - 6$ meters per second, and he starts 2 feet behind the starting line,
   a) Find the position after three seconds.
   b) Find the total distance traveled in those three seconds.

Given that $\int_{-1}^{1} f(x)dx = 3 \quad \int_{1}^{4} f(x)dx = 5 \quad \int_{3}^{4} f(x)dx = 3 \quad \int_{3}^{6} f(x)dx = 9$

9. Find $\int_{1}^{3} f(x)dx$
10. Find $\int_{1}^{6} f(x)dx$
11. Find $\int_{4}^{6} f(x)dx$
12. If f(x) is even, find, $\int_{-1}^{0} f(x)dx$
13. Find the average value of the function from -1 to 6.

For F(x)= $\int_{0}^{x} \sqrt{t^2 + 5} dt$ ,

14. Find $F'(2)$
15. Find $F'(0)$
16. Find $F''(2)$

Solve the Differential Equation

17. $D'(t) = 3t^2 - 2t \quad D(0) = 5$

Given that $\sum_{i=1}^{n} c = cn \quad \sum_{i=1}^{n} i = \frac{n(n+1)}{2} \quad \sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{6} \quad \sum_{i=1}^{n} i^3 = \frac{n^2(n+1)^2}{4}$,

18. Find $\sum_{j=1}^{4} 3j^2 - 5j + 2$. Show all work.
19. Approximate the area of the under the curve $y = 3\sin x + 2$ from 0 to π using the left hand endpoints for 4 subintervals. Draw a graph to illustrate what you are doing.
20. Evaluate $\int_0^{\pi} 3\sin x + 2 dx$
21. Compare the results between number 14 and 15. Explain.
22. Find the area of the region generated by intersecting $y = x^3$ and $y = x$.
23. Evaluate $\int_0^3 |3x - 4| dx$. Show all work.
24. Evaluate $\int_0^a (\sqrt{a} - \sqrt{x})^2 dx$. Show all work.
25. Evaluate $\int_2^5 \frac{4}{3} x^2 \sqrt{\frac{x^3}{5} - 5} dx$. Show all work.
26. If $\int_0^2 x^2 dx = \frac{8}{3}$, find $\int_{-2}^{0} 3x^2 dx$
27. If $f(x) = \ln(x\sqrt{x^2 + 7})$, what is $f'(x)$?
28. Find the derivative of g(x)= $\ln(\ln(x^{2009}))$.
29. Find all relative extrema and inflection points for $f(x) = x^5 \ln \frac{x}{9}$.
30. Use logarithmic differentiation to find the derivative of $y = \frac{\sqrt{8x^4 - 5}}{x + 1}$.

Find the indefinite integral

31. $\int \frac{x^2 + 4x + 10}{x^3 + 6x^2 + 30x - 4} dx$

32. $\int \frac{\cos 7\eta}{\sin 7\eta} d\eta$

33. If $f(\psi) = \psi^4 e^{\psi^3}$, find $f'(\psi)$.

34. Find $\int \ln(e^{13x^{12}+5}) dx$.

35. Solve for x. $7(2^{4x-6}) = 105$. Write the EXACT answer.

36. Find the derivative for $f(x) = \log_8(\frac{x^2-10}{x-6})$.