1. Convert $0.1\overline{2}$ into a reduced fraction.

2. Simplify: $2 + \frac{x-1}{1 + \frac{x}{x+3}}$

3. Complete the square: $x^2 - 6x + 18$

4. Complete the square: $ax^2 + bx + c = 0$

5. Given that $\int_0^2 f(x) dx = 4$, $\int_{-3}^0 f(x) dx = \frac{1}{2}$, and $\int_{-3}^2 g(x) dx = -2$, find
   a) $\int_{-3}^2 f(x) dx =$
   b) $\int_2^2 2f(x) + 3g(x) dx =$

6. Find $\int_{-2}^2 \sqrt{4-x^2} dx$ by using area.
For problems 7 through 15,
Find the following Definite & Indefinite Integrals:

7. \[ \int 3e^x + x^9 \, dx \]

8. \[ \int \sin x - 2 \sec^2 x \, dx \]

9. \[ \int \cot x \, dx \]

10. \[ \int \frac{45x^4 - 6x^2}{9x^5 - 2x^3 + 71} \, dx \]

11. \[ \int (2x - 1)^3 \, dx \]

12. \[ \int \frac{4}{16x^2 + 1} \, dx \]

13. \[ \int_0^{\pi/2} \sin^3 x \cos x \, dx \]

14. \[ \int_1^2 x e^{3x^2 - 4} \, dx \]

15. \[ \int_0^{7\pi/2} \cos \left(\frac{x}{7}\right) \, dx \]
16. \( \int_0^1 2^x \, dx \)

17. \( \frac{d}{dx} \int_2^x \frac{e^{x^2-x+2x}}{\tan(x^2-\sqrt{x^2-4})} \, dt \)

18. \( \frac{d}{dx} \int_0^x \left[ \frac{x^2 \sec^2 t \cdot \tan t + 7t}{dt} \right] \, dt \)

19. \( \int_0^1 \frac{d}{dx} \left( e^{\cos x} \right) \, dx \)

20. \( \int_0^{\pi/4} \frac{\sec^2 x}{1 + \tan x} \, dx \)

21. \( \int \frac{1}{x^2 - 6x + 18} \, dx \) \hspace{1em} (hint: complete the square on the bottom)

22. \( \int_1^2 x^2 \ln x \, dx \)

23. \( \int x^4 e^x \, dx \)
24. \( \int x^3 \cos(3x) \, dx \)

25. \( \int \frac{4x^2 + x - 1}{x(x^2 - 4)} \, dx \)

26. \( \int \frac{dx}{(x+1)(x-3)} \)

27. \( \int \sin^3 x \cos x \, dx \)

28. \( \int \tan^2 x \sec^4 x \, dx \)

29. \( \int_{1}^{\infty} \frac{1}{(2x+1)^3} \, dx \)
30. \( \int_{1}^{\infty} 4e^{-2x} \, dx \)

31. Find the area between the 2 curves: \( y = x^2 \) and \( y = 2x - x^2 \)

32. Given \( f(x) = x^2 - 5x + 2 \). Calculate the following Riemann Sums on the interval \([0, 2]\).
   
   a) \( L_4 = \) 

   b) \( R_4 = \) 

   c) \( M_4 = \) 

   d) \( T_4 = \) 

   e) \( S_4 = \)
32. f) calculate $\int_0^2 f(x)\,dx$

g) Which Riemann Sum was the most accurate?

h) If you wanted your approximation of $\int_0^2 f(x)\,dx$ by the Trapezoid Rule to be accurate to within .0015, how small an $n$ could you choose to still get that accuracy?

Miscel. Questions / Definitions

33. State the rule for integration by parts.

34. How do you tell whether to use partial fractions, an $\ln(\cdot)$, or an $\arctan(\cdot)$?

35. When would you use $u$-substitution versus integration by parts?