MATH 1526
Worksheet 1 - Integration
Use integration rules to evaluate the following integrals. You may have to use algebra first to get set up the problem in a form that matches the rules.

(1) \( \int \frac{z^3}{3} \, dz \) 

(3) \( \int (3t^2 - 4t + 5) \, dt \) 

(5) \( \int \left( \frac{2x^2}{7} - \frac{8}{3}x^4 \right) \, dx \) 

(7) \( \int \frac{-2\sqrt{x}}{3} \, dx \) 

(9) \( \int \frac{1}{\left(\sqrt{x^3}\right)} \, dx \) 

(11) \( \int \frac{2z - 5}{7} \, dz \) 

(2) \( \int \frac{7}{2\sqrt{y}} \, dx \) 

(4) \( \int (7 + e) \, dx \) 

(6) \( \int \left( \frac{e^x}{3} + 2x \right) \, dx \) 

(8) \( \int dw \) 

(10) \( \int \left( \frac{3w^2}{2} - \frac{2}{3w^2} \right) \, dw \) 

(12) \( \int (x^e + e^x) \, dx \) 

(13) Solve the following initial value problems:

(a) \( \frac{dy}{dx} = x^2 - x \); \( y(3) = 4 \); Find \( y \).

(b) \( y'' = x + 1 \); \( y'(0) = 0 \); \( y(0) = 5 \); Find \( y \).

(c) \( y'' = e^x + 1 \); \( y'(0) = 1 \); \( y'(0) = 2 \); \( y(0) = 3 \); Find \( y \).

(d) \( f''(x) = 6x + 2 \) and \( f'(-1) = 5 \); \( f(2) = 8 \)

(e) If \( dr/dq \) is a marginal revenue function when \( dr/dq = 100 - 3q^2 \). Find the demand function.

(f) If \( dc/dq \) is a marginal cost function where \( dc/dq = 0.003q^2 - 0.4q + 40 \) and fixed costs are $5000. Find the total cost when \( q = 100 \). What is the average cost of producing 100 items?