

---

# Indefinite Integrals and the Net Change Theorem

---

**Solutions should show all of your work, not just a single final answer.**

1. Evaluate each indefinite integral.

(a)  $\int \left( x^2 + \frac{1}{x^3} \right) dx$

(b)  $\int \frac{x^3 - 2\sqrt{x}}{x} dx$

(c)  $\int \frac{1}{\cos^2 x} dx$  (Hint:  $\frac{1}{\cos x} = \sec x$ )

2. Water is released into a tank at the rate  $r(t) = 5 + \sqrt{t}$  ft<sup>3</sup>/min at time  $t$  (in minutes). At time  $t = 1$ , there is 12 ft<sup>3</sup> of water in the tank.

(a) Evaluate  $\int_1^6 r(t) dt$ , rounding your answer to two decimal places.

(b) In the context given above, what does the value in part (a) tell us?

(c) Determine the volume of water in the tank at time  $t = 6$ .

3. T/F (with justification)  $\int \cos(x^2) dx = \sin(x^2) + C$ .