Activity 2.6 – Integrals of Linear and Quadratic Functions

1. (a) $5x^2 + C$

   (b) $\frac{3}{2}t^2 + 4t + C$

   (c) $u - \frac{1}{2}u^2 + C$

2. (a) $\left(5x^2\right)\Big|_1^2 = 5(2)^2 - 5(1)^2 = 15$

   (b) $\left(\frac{3}{2}t^2 + 4t\right)\Big|_0^1 = \left(\frac{3}{2}(1)^2 + 4(1)\right) - \left(\frac{3}{2}(0)^2 + 4(0)\right) = \frac{11}{2}$

   (c) $\left(u - \frac{1}{2}u^2\right)\Big|_{-2}^3 = \left((3) - \frac{1}{2}(3)^2\right) - \left((-2) - \frac{1}{2}(-2)^2\right) = \frac{5}{2}$

3. (a) $\int \left(2x^2 - x + 7\right)dx = \frac{2}{3}x^3 - \frac{1}{2}x^2 + 7x + C$

   (b) $\int \left(32 - 6w + w^2\right)dw = 32w - 3w^2 + \frac{1}{3}w^3 + C$

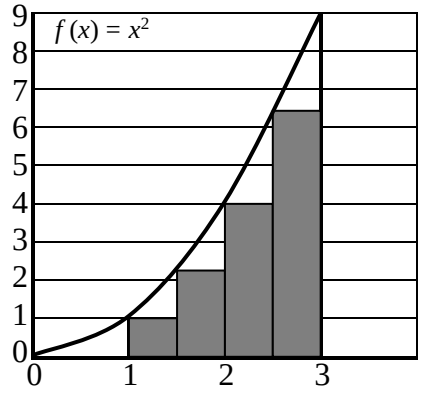
4. $\int_5^8 (10 + 8t)dt = \left(10t + 4t^2\right)\Big|_5^8 = \left(10(8) + 4(8)^2\right) - \left(10(5) + 4(5)^2\right) = 186$ cows

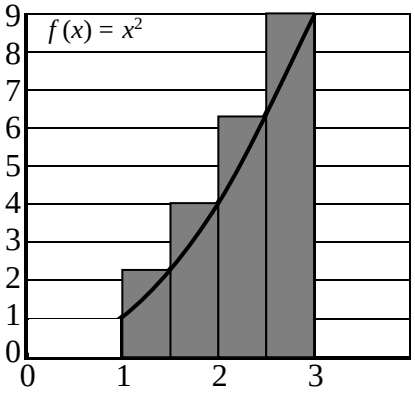
5. (a) $v(t) = -32t + 16$ ft/s

   (b) $s(t) = -16t^2 + 16t + 175$ ft

   (c) Set $-16t^2 + 16t + 175 = 0$ and solve for t (using the quadratic formula) to get t = 3.84 s.

   (d) $v(3.84) \approx -107$ ft/s

6. 

7. 

8. $L_4 = \left(1^2 + 1.5^2 + 2^2 + 2.5^2\right) \cdot 0.5 = 6.75$; $R_4 = \left(1.5^2 + 2^2 + 2.5^2 + 3^2\right) \cdot 0.5 = 10.75$.

   That is, $6.75 \le \int_1^3 x^2 dx \le 10.75$.

9. $\Delta x = (3 - 1)/8 = 0.25$