4. (a) \( K = 150 \text{ tons/hectare} \)  
(b) \( B'(a) = \frac{13500 e^{-a/10}}{(10 + 90 e^{-a/10})^2} \)

(c) \( B(a) = 75 \Rightarrow a = 10 \ln 9 = 22.0 \text{ years} \)

(d) \( B''(a) = r B' \left( \frac{K - B}{K} \right) + r B \left( - \frac{B'}{K} \right) = r B' \left( 1 - \frac{2B}{K} \right) = 0 \) when \( B = K/2 \) so \( B' \) is maximized when \( B = K/2 \). This implies that the stand being harvested at 22 years would be harvested when the biomass growth rate has been maximized. Harvesting later than this would give a period of stand growth at lower than the maximum growth rate.

5. \( N(t) = \frac{1}{2} t^3 + \frac{t^2}{2} + 4t + 2 \)

6. \[ \int_0^2 (4x - 2x^2) \, dx = 8/3 \]

7. (a) \( -\frac{3}{4} e^{-4x}(x + \frac{1}{4}) + C \)  
(b) \( \frac{4}{9} = .44 \)  
(c) \( \frac{(\ln x)^2}{2} + C \)

8. (a) \( L'(0) = .2 (40 - 3) = 7.4 \text{ cm/month} \)

(b) \( L(0) = 3 = 40(1 - e^{-2t_0}) \Rightarrow t_0 = 5 \ln(37/40) = -.39 \)

so \( L(t) = 20 = 40 \left( 1 - e^{-2(t + .39)} \right) \) which implies \( t = -5 \ln(1/2) - .39 = 3.07 \text{ months} \)

9. \[ \int_0^6 40 \left( 12 - x \right) \pi \left( \frac{-1}{4} x + 6 \right)^2 \, dx = 61830 \pi = 194244 \text{ kg m} \]

10. (a) \( y(t) = 4 e^{t^2} + t \)  
(b) \( N(t) = c t^{1/2} \)