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

(c) B(a) = 75 $\Rightarrow$ a = 10 ln9 =22.0 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) $-\frac{3}{4} e^{-4x}\left(x + \frac{1}{4}\right) + C$ (b) $\frac{4}{9} = .44$ (c) $\frac{(\ln x)^2}{2} + C$

8. (a) L′(0) = .2 (40 - 3) = 7.4 cm/month

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

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

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

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