

ANSWERS TO REVIEW EXERCISES 2 (USER BEWARE)

1. ≈ 300 feet
2. ≈ 2.856 mph
3. 30 nerdometers per nerdochrone
4. (a) $\frac{1}{3}(1 - e^{-27})$ (b) $\frac{1}{2}(1 - 10e^{-9})$ (c) $2 - \frac{5}{e}$
 (d) $\frac{1}{2}(e^\pi + 1)$ (e) 2
5. Substitution: $\frac{2}{5}(x - 1)^{5/2} + \frac{2}{3}(x - 1)^{3/2} + C$
 Integration by parts: $\frac{2}{3}x(x - 1)^{3/2} - \frac{4}{15}(x - 1)^{5/2} + C$
 Reconciliation: $\frac{2}{5}(x - 1)^{5/2} + \frac{2}{3}(x - 1)^{3/2} = (x - 1)^{3/2} \left(\frac{2}{5}x - \frac{2}{5} + \frac{2}{3} \right)$
 $= (x - 1)^{3/2} \left(\frac{2}{5}x + \frac{4}{15} \right) = (x - 1)^{3/2} \left(\frac{2}{3}x - \frac{4}{15}x + \frac{4}{15} \right)$
 $= \frac{2}{3}x(x - 1)^{3/2} - \frac{4}{15}(x - 1)^{5/2}$
6. (a) $y = C/\sqrt{1 + t^2}$ (b) $y = 1/(2t^{3/2} - C)$, and $y = 0$
 (c) $y = Ce^{\frac{1}{2}\sin^2 t}$
7. (a) $y = 1 - \frac{1}{\frac{t^3}{3} + C}$, and $y = 1$
 (b) $y = 1 - \frac{1}{\frac{t^3}{3} + 1}$ (c) $y = 1$
8. (a) $y = 1/(2t^{3/2} - C)$ and $y = 0$
 (b) $y = 1/(2t^{3/2} - 1)$ (c) $y = 0$
9. (a) $-1/(t + C)$, and the zero function
 (b) $\left(\frac{t + C}{2} \right)^2$, and the zero function
10. (a) $P' = .1P + 200,000 - A$
 (b) $P(t) = 10A - 2,000,000 + Ce^{-1t}$
 (c) $P(t) = 10A - 2,000,000 + (3,000,000 - 10A)e^{-1t}$
 (d) $A = 300,000$
11. (a) $P' = .045P - 9000$ (b) $P(t) = 200,000 - Ce^{.045t}$
 (c) $P(t) = 200,000 - 164,000e^{.045t}$ (d) ≈ 4.4 years
12. (a) $P' = -.001P + A$ (b) $P(t) = 1000A + Ce^{-.001t}$
 (c) $A \geq 40,000$