

Answer keys to Exam I, Fall 2004

Problem 1: c

Problem 2: a

Problem 3: d

Problem 4: b

Problem 5: a

Problem 6: (a). Plug it in.

(b). $C = 14$

Problem 7: (b). $y = 2$ stable, $y = -2$ unstable.

(d). $y \rightarrow 2$.

Problem 8: (a). O.D.E. is $Q' = 2 - \frac{3Q}{60-t}$. Answer is: $Q(t) = \frac{(t-60)^3}{3600} - (t - 60)$.

(b). Skip.

Problem 9: (a). $t_0 = 1, y_0 = 1$, and $y_{n+1} = y_n + hf(t_n, y_n) = y_n + h(1 + t_n)$, for $n = 0, 1, 2, \dots$.

(b). $y_1 = 1.2$.

(c). Exact solution $y(t) = 0.5t^2 + t - 0.5$, $y(1.1) = 1.205$, error is 0.005.

Problem 10: (a). $2y^2 + 5y = 3t + C$.

(b) $C = 7$. Explicit expression $y(t) = -\frac{5}{4} + \sqrt{\frac{3}{2}t + \frac{81}{16}}$.

Problem 11: (a). $t = 0.7s$

(b). Max height is 2.45 meter.