(1) (a) Linear (b) Nonlinear, since the dependent variable is exponentiated.

(c) Nonlinear, since the derivative of the dependent variable is squared.

(d) linear.

---

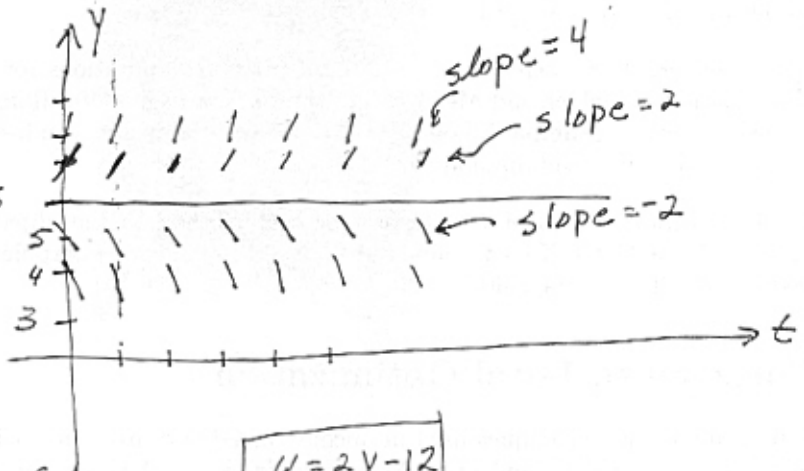
(2) (a) Second order (b) First order

(c) Third order (d) First order

---

(3) $\frac{dy}{dt} = 2y - 12$.

(a)



(b) $\int \frac{dy}{2y-12} = \int dt$

$u = 2y - 12$

$\frac{du}{2} = dy$

$\frac{1}{2}\int \frac{du}{u} = dt \Rightarrow \frac{1}{2}\ln|u| = t + c \Leftrightarrow u = \tilde{K}e^{2t}$.

$2y - 12 = \tilde{K}e^{2t} \Rightarrow \boxed{y = 6 + Ke^{2t}}$.

(c) $y(0) = 1 = 6 + K \Rightarrow K = -5 \Rightarrow \boxed{y(t) = 6 - 5e^{2t}}$.

(d) $2y - 12 = 0 \Rightarrow y = 6$. This is an unstable equilibrium, since $y' > 0$ for $y > 6$ and $y' < 0$ for $y < 6$.