

$$1) \quad x' = e^{x/t} + \frac{x}{t} \Rightarrow x = -\ln(-\ln|t| + C)$$

Hint:  $x = tz$   $t \in (-e^c, 0) \text{ or } (0, e^c)$

$$2) \quad x' - 2tx = 2t^3 x^2 \Rightarrow x \equiv 0, t \in \mathbb{R}$$

Hint:  $z = x^{-1}$   $x = (ce^{-x^2} + 1 - x^2)^{-1}$

$$3) \quad x' = \frac{x-t}{x+t} \Rightarrow \frac{1}{2} \ln(z^2 + 1) + \arcsin z = C - \ln|x|$$

Hint:  $x = tz$  Cannot invert !!

$$4) \quad x' - 9t^2 x = (t^5 + t^2)^3 \sqrt[3]{x^2}, x(0) = 0$$

Hint:  $z = \sqrt[3]{x}$   $x \equiv 0, t \in \mathbb{R}$

or  $x = \left( ce^{t^3} - \frac{t^3 + 2}{9} \right)^3$

$$5) \quad t^2 x' = x^2 + 2tx$$

Hint:  $x = tz$   $x = 0 \text{ or } x = -t, t \in \mathbb{R}$

(or  $z = x^{-1}$ )  $x = \frac{t^2}{C-t}, t \neq C$

$$6) \quad 2txx' + t^2 - x^2 = 0 \Rightarrow x = \pm \sqrt{C^2 - (t-C)^2}$$

Hint:  $x = tz$  (or  $z = x^2$ )  $t \in (2c, 0)$  if  $c < 0$

$t \in (0, 2c)$  if  $c > 0$