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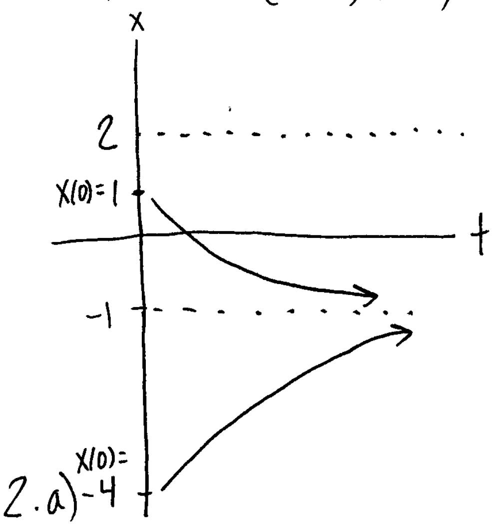
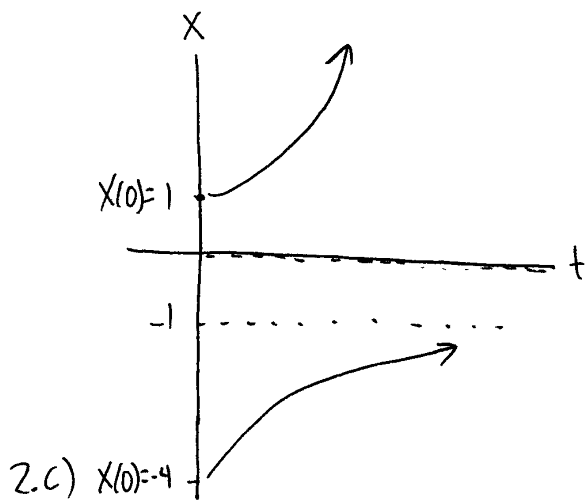
1. To determine the value of a, examine a given population of left and right curling snails. Once the population size has stabilized, i.e. $\frac{dR}{dt} = \frac{dL}{dt} = 0$, solve either equation for a, substituting in the observed values of L and R.

(other solutions are also possible)

1. a) $f(x) = (x+1)(x-2) \quad x(0)=1$



1. c) $f(x) = (x+1)x$



3. a) equilibrium point at $x=-1$ (stable), $x=2$ (unstable)
   c) equilibrium point at $x=-1$ (stable), $x=0$ (unstable)

4. a) $g_1(x) = f(x_0) + f'(x_0)(x-x_0)$

$f(x) = xe^{-6x} \quad f'(x) = e^{-6x} + (-6x)e^{-6x}$

$g_1(x) = 0 + 1(x-0) = x$

c) $f(x) = 4x + x^2 \quad f'(x) = 2x+4$

$g_1(x) = 0 + 4(x-0) = 4x$

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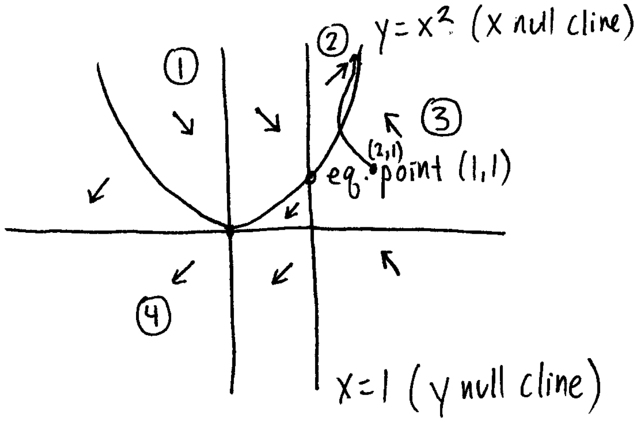
5. a)



$$\frac{dx}{dt} = y - x^2$$

$$\frac{dy}{dt} = x - 1$$

b) ① $\frac{dx}{dt} > 0, \frac{dy}{dt} < 0$ ② $\frac{dx}{dt} > 0, \frac{dy}{dt} > 0$ ③ $\frac{dx}{dt} < 0, \frac{dy}{dt} > 0$

④ $\frac{dx}{dt} < 0, \frac{dy}{dt} < 0$

c) if $x(0)=2$, $y(0)=1$, $x(t)$ and $y(t)$ move away from the origin along the trajectory $y=x^2$ as $t \to \infty$

d) If $x(0)=0$, $y(0)=0$, $x(t)$ and $y(t)$ decrease for small values of t, but the decrease in x will be minimal

$x(t) < x(0)$, $y(t) < y(0)$