1. a.

t	y	logit	y	logit
0	.015	-4.185	.005	-5.293
5	.156	-1.688	.092	-2.289

$r_L = \frac{-1.688 - (-4.185)}{5}$ $\quad$ $r_L = \frac{-2.289 - (-5.293)}{5}$

$= 0.5/yr$ $\quad$ $= 0.6/yr$

16

b. Initial disease (y0) is also different. Thus, change in y (Δy) cannot be directly compared. With logistic, dy/dt is always changing, depending on y: 

.

8

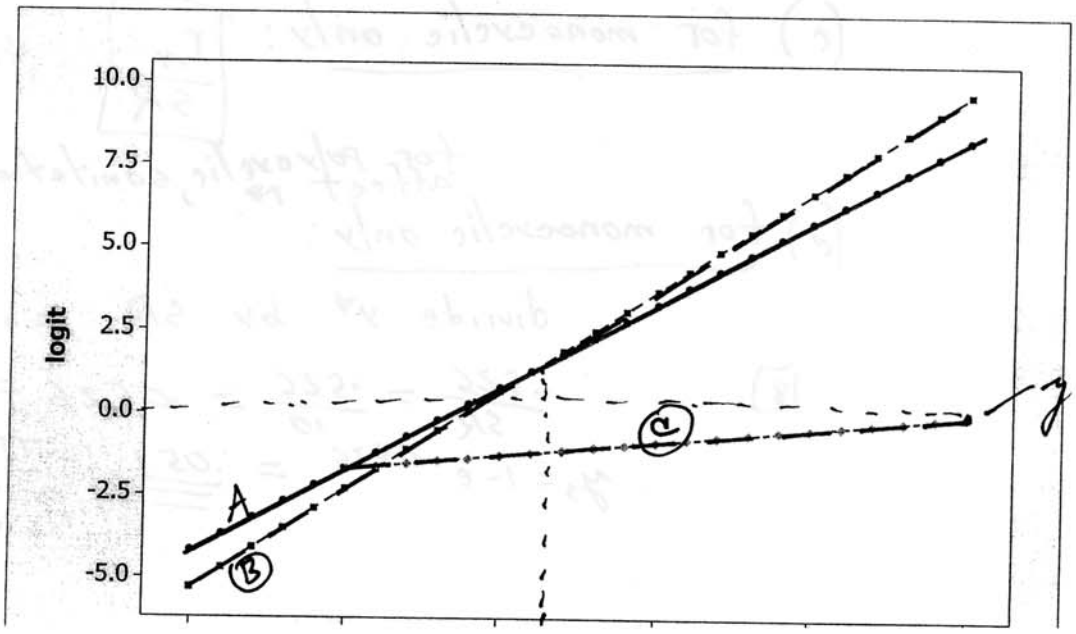
c. $logit(.90) = 2.197$ $\quad$ $y^*(t_2) = y^*(t_1) + r_L y^*(t_2 - t_1)$

$2.197 = -4.185 + .5(t)$ $\quad$ $2.197 = -3.293 + .6(t)$

$t = 12.8\ yr$ $\quad$ $t = 12.5\ yr$

16

(d)



16

f. $y^*(25) = y^*(5) + r_L(25-5)$ ← (new start) or $y^*(20) = y^*(0) + r_L(20)$ (old year 5)

$\log_{10}(.5) = 0$

$0 = -1.688 + r_L(20)$ ← 20 years from year 5

$\frac{1.688}{20} = .084/yr$ [10]

---

2. (a)

t	y	$MIT(y^*)$
0	.001	.001
7	.100	.105

[8]

$r_m = \frac{.105 - .001}{7} = .015/day$

(b) $y^* = .001 + (.015)(35)$ [8]

$= .526 = \ln\left(\frac{1}{1-y_{35}}\right)$

backtransform: $.526 \rightarrow y = .409$

directly: $y = 1 - e^{-y^*}$

$= 1 - e^{-.526} = .409$

(c) for monocyclic only: $\frac{r_m}{SR}$ thus, $r_m = \frac{.013}{10} = \frac{.0013}{day}$ [4]

for polycyclic, sanitation does not affect r^*.

(d) for monocyclic only:

divide y^* by SR, and backtransform

[8] $\frac{.526}{SR} = \frac{.526}{10} = .0526 = y_s^*$

$y_s = 1 - e^{-.0526} = .051$

could also do $y_{35} = \frac{.001}{10} + \frac{.013}{10} \cdot 35 = .0526$, $y_s = .051$