

### HW 7

①

(a) i)  $f(x) = \frac{5}{2}x(n)(1-x(n))$  Steady-state: 0.6

ii)  $f'(x) = \frac{5}{2} - 5x$   $f'(0) = \frac{5}{2} > 1 \therefore \text{UNSTABLE}$

$f'(.6) = |2 - 2.5| = .5 < 1 \therefore \text{STABLE}$

iii) Confirms 0 is unstable & .6 is stable

(b) i)  $f(x) = \frac{29}{10}x(n)(1-x(n))$  Steady-state: .655

ii)  $f'(x) = \frac{29}{10} - \frac{29}{5}x$   $f'(0) = 2.9 > 1 \therefore \text{UNSTABLE}$

$|f'(.655)| = .9 < 1 \therefore \text{STABLE}$

(c) i)  $f(x) = \frac{31}{10}x(n)(1-x(n))$  Steady-state: .677

$f'(x) = \frac{31}{10} - \frac{31}{5}x$   $f'(0) = 3.1 > 1 \therefore \text{UNSTABLE}$

$|f'(.677)| = 1.1 > 1 \therefore \text{UNSTABLE}$

② (a) i)  $f'(x) = \frac{3}{5}x^2 - \frac{12}{5}x + \frac{32}{5}$   $f'(1) = 1.4$  UNSTABLE  $f'(3) = 1.4$

$f'(2) = .8$  STABLE UNSTABLE

(b)  $f'(x) = \frac{5}{8}x^2 - \frac{5}{2}x + \frac{39}{8}$   $f'(2) = 1.375$  UNSTABLE

$f'(3) = .75$  STABLE

$f'(4) = 1.75$  UNSTABLE