FSTY 405 — Silviculture II

Final exam, 6th December 2001

Name:

Student number:

- Ensure that your name and student number are correctly entered above.
- Answer in the spaces provided after each question, writing down clearly the intermediate steps. Use the reverse as scratch pad.
- Write clearly, and use ink, not pencil.
- Pages: 5. Questions: 10 (counting lettered parts), worth 3 marks each unless stated otherwise. Total 33 marks.
- Time: 2.5 hours.

1. We have the following model:

$$V = 0.3BH - 4.2 \quad (1)$$
$$\Delta B = 3 - 0.02B - 0.04H \quad (2)$$
$$\Delta H = 1.7 - 0.03H \quad (3)$$

where V is volume (m^3/ha), B is basal area (m^2/ha), H is top height (m), and t is time (years). Increments are for 4-year periods.

(a) Indicate:

State variable(s):

Transition function(s):

Output function(s):

(b) Draw a System Dynamics (rate-level, Vensim) diagram for this model. Label the elements appropriately.

(c) A 40 year-old stand has $V = 75$, $B = 22$, $H = 12$. At age 44, 50% of the basal area is removed in a thinning. Estimate the basal area at age 48.

2. For ages up to 120 years, the VDYP volume equation is

$$V = b_0 + b_1 H + b_2 HA + b_3 H^2 C + b_4 AC \ , \tag{4}$$

where V is total volume (m^3/ha), H is top height (m), A is breast-height age (years), and C is canopy closure (%). The regression parameters for lodgepole pine are:

i:	0	1	2	3	4
b_i:	79.0	-10.5	0.0628	0.0235	-0.0830

Goudie's site index model, for site index 19 simplifies to:

$$H = 34.93 - 4613/(A^{1.285} + 137.2)$$

(the coefficients, except for 1.285, vary with site).

(a) For site index 19 and 80% canopy closure, what is the MAI at 100 years breast-height?

(b) In relation to this, explain Eichhorn's rule. What is it, does it apply here?

(c) This model is a normal, an empirical, or a variable-density yield table? Explain why (including why it would be a yield table).

3. Explain what is, where is it used:

(a) Competition index

(b) Guide curve

(c) Spatial correlation

4. (6 marks) Classify the following models:

	Prognosis	TADAM	TASS
Deterministic			
Continuous			
Distance-dependent			
Aspatial (non-spatial)			
Stand-level			
Discrete			
Stochastic			
Individual-tree			

Place in each box a **Y** for *yes*, or an **N** for *no*.
Note: for terms that are opposites, you need to have both right to score.