FSTY 405 — Silviculture II

Final exam, 7th December 2000

Name:

Student number:

- Ensure that your name and student number are correctly entered above.
- This is a closed book exam. Calculators are allowed.
- Time: 2.5 hours.
- Pages: 7. Questions: 10, worth 4 marks each.
- Answer in the spaces provided after each question or circle the answer, as appropriate.
- Show clearly the intermediate steps and reasoning.
- Use ink, write legibly.
- Area of circle of radius r: πr^2.

1. A 50 year-old stand has 800 stems per hectare, 24 m top height, and a (quadratic) mean dbh of 25 cm. We have the following stand volume table:

$$V = (0.9 + 0.3H)B$$

(with V in m^3/ha, H in m, and B in m^2/ha). Calculate the mean anual increment.

2. Classify the following models:

	TASS	Prognosis	MGM	VDYP
Dynamic				
Distance-independent				
Spatially explicit				
Whole stand				
Static				
Single-tree				

Place in each box a **Y** for *yes*, or an **N** for *no*.

3. Fill in the blanks:

Age (years)	Yield (m^3/ha)	PAI (m^3/ha-yr)	MAI (m^3/ha-yr)
20	.....		3
		.....	
30	105		.....
		5.5	
40	.....		.....

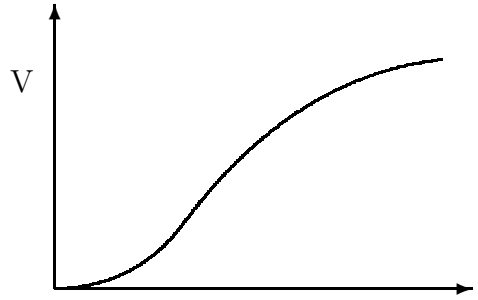
(Note that changes are on the intervals between ages).

4. You are given the top height growth model

$$\ln H = 4.32 - b/t^{0.75} \ ,$$

with b a site-dependent parameter. The top height of a 35 years-old stand is 18 m. Estimate the site index (base age 50 years).

5. Using this yield curve diagram:



Locate the age of maximum MAI (no marks for that). How is the MAI related to the (instantaneous) growth rate at that age? Explain.

6. A normal yield table is one based on stands

   (a) in good quality sites

   (b) of high density

   (c) with no mortality

   (d) with a standard thinning regime

   (e) representative of the average

7. We have the following model, with annual increments:

$$\begin{aligned} \Delta H &= b_0 && (1) \\ \Delta B &= (b_1 - b_2 B)/H && (2) \\ V &= b_3 B H && (3) \end{aligned}$$

$$b_0 = 1.8 \qquad b_1 = 170 \qquad b_2 = 1.8 \qquad b_3 = 0.3 \ ,$$

where H is top height (m), B is basal area (m^2/ha), and V is volume (m^3/ha).

A 12 year-old stand has $H = 20$ m, and $B = 35$ m^2/ha. At age 13, half of the basal area is removed in a thinning. Predict the volume at age 14.

8. In the model of question 7:

   A. V or (3) is/are:

      (a) state variable, (b) output function, (c) transition function, (d) control variable.

   B. This is a model:

	True/False	Opposite
(a) continuous		
(b) individual-tree		
(c) static		
(d) discrete		
(e) stochastic		
(f) stand-level		
(g) deterministic		
(h) dynamic		

      Enter **T** or **F** in the second column, and the letter for the opposite in the third one.

9. Assume that the Eichorn law holds (for all stand variables, not just volume). Would the number of trees per hectare at a given age be higher or lower in good sites compared to poor sites? Why? (No marks for the first question!)

10. You have the following site index model:

$$H = 1.3 + 2.52S\,\mathrm{e}^{-\frac{46.2}{t}} \ ,$$

where H is top height (m), S is the site index (m), and t is age at breast height (years), Write down an equation to calculate site index from the 5-year growth intercept I. Assume that the age for the first whorl above breast height is half a year more than breast-height age.