FSTY 405 — Silviculture II

Midterm, 23rd October 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: 3. Questions: 4 (counting lettered parts), worth 3 marks each.

- Time: 45 minutes.

- Info: $\ln xy = \ln x + \ln y$, $\ln x^y = y \ln x$, $y = \ln x \Leftrightarrow x = e^y$, $e^{x+y} = e^x e^y$

1. You are given a height-age equation

$$H = a \left(\frac{A}{b + A} \right)^4 ,$$

where H is top height (m), and A is age (years). Assume $b = 9.47$, and site index 20 (base age 50). Estimate the age at which a height of 30 m is reached.

2. Indicate three (important) applications of growth models.

3. On page 19 of the textbook, the following basal area increment $(\mathrm{m}^2/\mathrm{ha\text{-}year})$ equation for uneven-aged cypress pine in Queensland is given:

$$\ln \Delta B = -3.071 + 1.094 \ln B + 0.007402 BS - 0.2258B \ ,$$

where S is "site form", an index of site productivity.

(a) Take $S = 17$. Show that the basal area increment can be written as
$$\Delta B = aB^b \mathrm{e}^{-cB} \ .$$

Calculate: $a = \dots\dots\dots$, $b = \dots\dots\dots$, $c = \dots\dots\dots$

(b) How would you simulate this in Vensim? Show the diagram and equation entries.
(Reminder: Euler's method with a one-year step accumulates the annual increments).