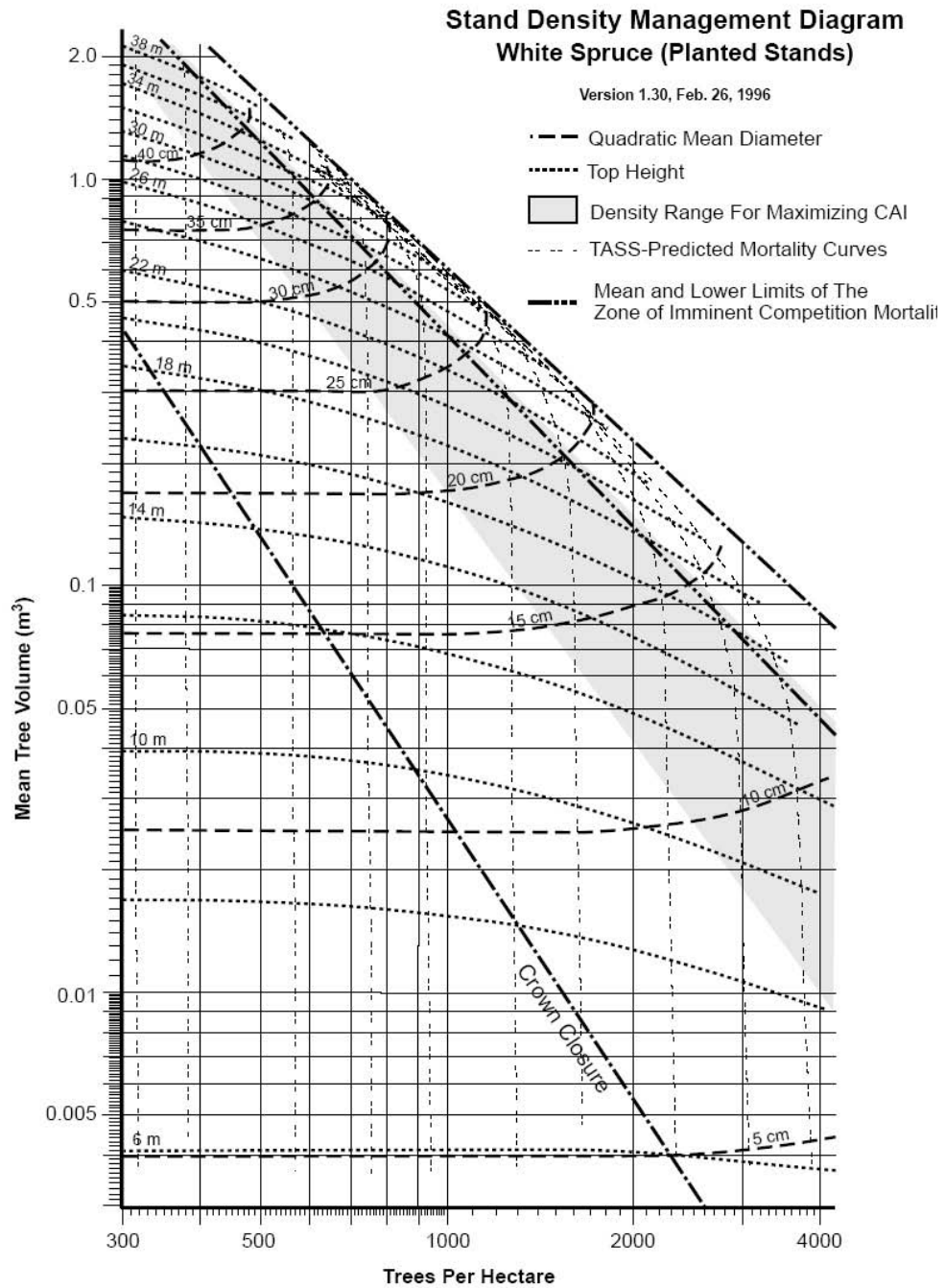# FSTY 405 — Silviculture II

Final Exam, 10th December 2003

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. Writing just the final numerical answer is *not* acceptable.

- Write clearly, and use ink, not pencil.

- Pages: 5. Questions: 5, worth 2 marks each.

- Answer clearly and to the point. Writing nonsense causes marks to be taken off.

- Info (you may or may not need this): $\ln xy = \ln x + \ln y$, $\ln x^y = y \ln x$, $y = \ln x \Leftrightarrow x = \mathrm{e}^y$, $\mathrm{e}^{x+y} = \mathrm{e}^x \mathrm{e}^y$. Circle area $= \pi r^2$.

1. (Hint: draw pictures!)

   (a) Trees are planted at a density of 1600 trees/ha and square spacing (i.e., on all points of a square grid). Which is the spacing (i.e., closest distance between trees)? Show your calculations.

   (b) The crowns have the profile assumed by TASS: $w = 3.43 \ln(L/6.1+1)$, where w is crown radius and L is distance from the top. For trees of equal height, at what height do the crowns first touch?

2. Consider two spruce stands planted at 2000 trees/ha, and harvested at 22 m top height: one unthinned, and the other thinned 50% (by number) at 8 m top height. On the following diagram,

Stand Density Management Diagram
White Spruce (Planted Stands)

Version 1.30, Feb. 26, 1996

·−·− Quadratic Mean Diameter

········· Top Height

Density Range For Maximizing CAI

·−··−·· TASS-Predicted Mortality Curves

Mean and Lower Limits of The
Zone of Imminent Competition Mortality

(a) Draw both state-space trajectories. Mark the ends clearly with a dot or small circle. Work as accurately as you can.

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(b) What is the volume **per hectare** and mean dbh at harvest for each stand?

3. Explain what is: (a) competition index, (b) Eichhorn's law, (c) area potentially available (APA), (d) Pressler's hypothesis (pipe model theory),

4. The following example site-index model for slash pine (base age 25 years) is taken from the textbook of Clutter *et al.*:

$$S = H\{[1 - exp(-25K)]/[1 - exp(-KA)]\}^{1/(1-m)}$$

where $K = 0.100354$, $m = 0.516188$, and S and H are site index and top height, respectively, both in feet.

(a) For site index 65 (feet), calculate the height at age 16.

(b) For site index 65 (feet), calculate the age for a height of 40 feet.

5. Explain what are each of TIPSY, TASS, and TADAM, and how are they related.