

Silviculture Quantitative Practice Problems List

Some problems adapted from bonuses submitted by: Reid Pitts, Alejandra Martinez, and Nathan Homeier.

Number	Topic	Resource	Spring Week	Fall Week
1	Rectangular Plot	Review (Biometrics)	1	1
2	Circular Plot	Review (Biometrics)	1	1
3	Rectangular Stand	Review (Biometrics)	1	1
4	Clinometer	Review (Biometrics)	1	1
5	Diameter Distribution	Lecture 2	2	1
6	BAG	Prescription Lab	3	3
7	BAG	Prescription Lab	3	3
8	Planting Spacing	Mini-Lecture 1	3	3
9	Planting Spacing	Mini-Lecture 1	3	3
10	Cone Count	Lecture 6, Natural Pine Lab	4	3
11	MAI	Mini-Lecture 2	5	5
12	Area Regulation	Lecture 10	6	5
13	Area Regulation	Lecture 10	6	5
14	Group Size	Lecture 10	6	5
15	Group vs Patch Size	Lecture 10	6	5
16	q Factor	Lecture 10	6	5
17	q Factor	Lecture 10	6	5
18	q Factor	Lecture 10	6	5
19	Regen Surveys	Regen Survey Lab	7	7
20	Ordering Seedlings	Lecture 15	8	8
21	Ordering Seedlings	Lecture 15	8	8
22	Thinning	Lecture 18	12	10
23	Stocking	Lecture 19	12	11
24	Stocking	Lecture 19	12	11
25	Stocking	Lecture 19	12	11
26	Stocking	Lecture 19	12	11
27	Fertilizer	Lecture 21	14	12
28	Fertilizer	Lecture 21	14	12
29	Fertilizer	Lecture 21	14	12
30	Pruning	Lecture 25	16	15

1. Calculate the short side length of a rectangular $1/80^{\text{th}}$ hectare plot in meters. The long side is 40 m.
1 hectare = 10,000 m², $\pi = 3.14159$ **SOLUTION:** <https://youtu.be/MCIAVBQmsTw>



2. Calculate the radius of a circular $1/35^{\text{th}}$ acre plot in feet. 1 acre = 43560 ft², $\pi = 3.14159$
SOLUTION: <https://youtu.be/die1Cr0HKYU>



3. Calculate the area of a stand in acres if it is a rectangle 13 chains wide by 27 chains long.

SOLUTION: <https://youtu.be/7LdzPXHr34>



4. To determine the height of a tree using a clinometer standing 80 feet from the tree, observe the top at 124% and the base at -6%. What is the height of the tree? Did you over- or under-estimate its height? **SOLUTION:** https://youtu.be/IVQY_3e-FH8



5. Draw a diameter distribution and correctly label the axes for an even-aged stand.

SOLUTION: <https://youtu.be/HB8QwT-8EP0?t=577>



6. A tree has a dbh of 12 inches, bark thicknesses of 0.5 and 0.8 inches, and a 5-year ring width of 0.8 inches. What is BAG_5 , including units?

SOLUTION: <https://youtu.be/6AwGvRZG3yE>

$$BAG_5 = \left[\left(\frac{BA_{\text{now}}}{BA_5} \right)^{\frac{1}{5}} - 1 \right] \times 100$$



7. A tree has a dbh of 16 inches, bark thicknesses of 0.7 and 0.9 inches, and a 10-year ring width of 0.4 inches. What is BAG_{10} , including units?

SOLUTION: https://youtu.be/jyAxY_LJVKU

$$BAG_{10} = \left[\left(\frac{BA_{\text{now}}}{BA_{10}} \right)^{\frac{1}{10}} - 1 \right] \times 100$$



8. A stand was planted on a 7 x 13 foot spacing. How many trees per acre were planted, including units? **SOLUTION:** <https://youtu.be/QExil9hB1-Y>



9. List two spacings you can use to plant approximately (i.e. +/- 20) 600 trees per acre.

SOLUTION: <https://youtu.be/PONyMUK6uLU>



10. You count 14 cones per tree and 22 seeds per cone in a longleaf pine stand. Assuming you need 50,000 seeds per acre to successfully regenerate the stand, how many seed trees should you leave per acre? Is this a good year to regenerate if you currently have 61 TPA in the overstory?

SOLUTION: <https://youtu.be/JPEcuGpl8UY>



11. A stand is thinned, removing 13, 10, and 5 tons/acre respectively of pulpwood, chip-n-saw, and sawtimber. A clearcut at age 32 then removes 42, 0, and 64 tons/acre of the same products listed above, respectively. What is the mean annual increment for this stand?

SOLUTION: <https://youtu.be/xWSRNqchDk0>



12. You are managing a 440 acre stand using a selection silvicultural system relying on area regulation. To meet your product objectives, your target is a 55 year rotation. What area within the stand can be harvested at each entry if the landowner would like income on a cutting cycle of 6 years?

SOLUTION: <https://youtu.be/p08LYwTYXw8>



13. If a stand is 200 acres, is on a 15 year cutting cycle in a selection system being regulated by area, and 40 acres is harvested at each entry, what is the rotation length?

SOLUTION: <https://youtu.be/F-L19doxxYE>



14. A group cut is circular and 75 feet in RADIUS. What is the area of the group cut in acres?

$\pi = 3.14159$ **SOLUTION:** https://youtu.be/1x_kiztWxoE



15. A stand has a canopy height of 95 feet and openings have been cut that are 0.6 acres in size. Is this regeneration method technically group selection, or patch selection? $\pi = 3.14159$

SOLUTION: <https://youtu.be/H0uvANETQmU>



16. There are 150 trees in the 11 inch diameter class, and 225 trees in the 10 inch diameter class. What is the q-factor of this stand, assuming it follows a reverse-J diameter distribution?

SOLUTION: <https://youtu.be/Q7zQyLrKWNg>



17. A stand has a q-factor of 1.25 with 120 trees in the 12" dbh class. How many trees in the stand are present in the 13" dbh class?

SOLUTION: https://youtu.be/2W_hxZ4H8UA



18. What does a smaller q-factor indicate? **SOLUTION:** <https://youtu.be/bzE2wI3MKs4?t=2128>



19. You are doing a regen survey via the stocked quadrat method. Your target stocking level is 150 trees per acre. If you are using circular plots, what would their radius be? 1 acre = 43560 ft², $\pi = 3.14159$

SOLUTION: <https://youtu.be/zQWTvRFKviw>



20. You are ordering seedlings to plant a 173 acre stand planted at 436 trees per acre. Document your calculations to determine what you will order. **SOLUTION:** <https://youtu.be/pVGBwTJFTgw>



21. You supervise planting a 74 acre stand on a 10 x 10 foot spacing. How many seedlings should you order, and what will they cost at \$72 per thousand?

SOLUTION: <https://youtu.be/UDdGCZSqAl4>



22. A stand with 360 trees per acre and a basal area of 240 ft²/ac is third row thinned. What is the QMD after thinning?

SOLUTION: <https://youtu.be/xx9oGgvaagY>



23. What is the relative density of a loblolly pine stand if QMD = 9 inches and there are 300 trees per acre? Should you thin this stand?

SOLUTION: <https://youtu.be/LsfeeTHT29E>

$$QMD = \sqrt{\frac{BA/TPA}{0.005454}}$$

$$SDI = TPA * [(QMD/10)^{1.605}]$$



24. If there are 125 trees per acre and a basal area of 215 ft²/ac, what is the QMD? What is likely to be the most common product class in this stand, based on size alone?

SOLUTION: <https://youtu.be/ifzUzFbrUck>

$$QMD = \sqrt{\frac{BA/TPA}{0.005454}}$$

$$SDI = TPA * [(QMD/10)^{1.605}]$$



25. A loblolly pine stand is planted on a 15 x 15 foot spacing and allowed to grow to a QMD of 8 inches. Assuming no density dependent mortality, should this stand now be thinned based on these data?

SOLUTION: <https://youtu.be/fsdZHmB57sM>

$$QMD = \sqrt{\frac{BA/TPA}{0.005454}} \quad SDI = TPA * [(QMD/10)^{1.605}]$$



26. Douglas-fir in California has a max SDI of 600. You cruise a stand and find 190 ft²/ac and 275 TPA. What is the relative density, and what silvicultural treatment would you recommend based on this?

SOLUTION: <https://youtu.be/8pJyoUxU1k0>

$$QMD = \sqrt{\frac{BA/TPA}{0.005454}} \quad SDI = TPA * [(QMD/10)^{1.605}]$$



27. Concentrated superphosphate (0-44-0) is applied to meet a desired rate of 10 pounds per acre of elemental P. How much fertilizer is applied per acre? $P_2O_5 = 43.6\%$ P; $K_2O = 83.3\%$ K

SOLUTION: <https://youtu.be/giWiBKdgCuo>



28. An application of 150 lbs per acre of potash (0-0-60) is performed. How much elemental K is applied? $P_2O_5 = 43.6\%$ P; $K_2O = 83.3\%$ K

SOLUTION: <https://youtu.be/5SLASNHcTxI>



29. You are prescribing fertilizing a stand at a rate of 100 lbs. of N and 25 lbs. of P per acre (elemental rates). How many lbs. of DAP (18-46-0) and Urea (45-0-0) will you apply? Document all your work.
 $P_2O_5 = 43.6\% P$; $K_2O = 83.3\% K$ **SOLUTION:** <https://youtu.be/Vc73fduM-4E>



30. What total height would a loblolly pine have to reach before you would be able to prune the lowest 21 feet of the bole without risking reduced growth. **SOLUTION:** <https://youtu.be/rwRqJ7DKoQg>

