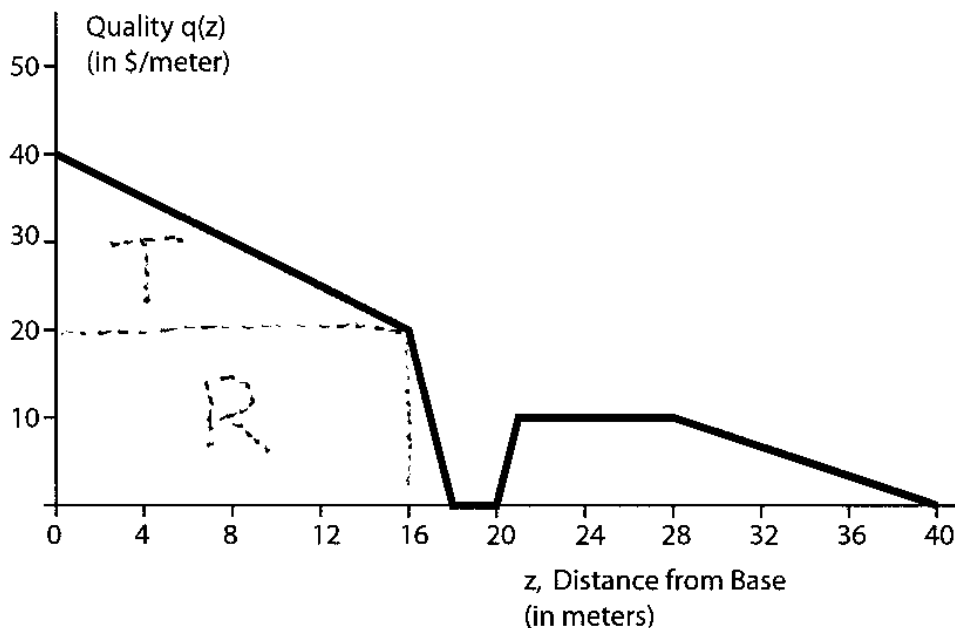


8. (7 pts) A particular tree trunk 40 meters long will be cut for lumber. Let z be the distance from the tree's base to another point on the tree. At each point z , the lumber company assesses the quality $q(z)$ (in dollars per meter) of the tree at that point. This measurement — worth per meter's length — is higher at the base of the tree (because it is wider there), and can vary due to "imperfections" in the wood.



a) (4 pts) Calculate or estimate $\int_0^{16} q(z) dz$. Show your work.

Integrate "visually": the area under the graph between $z=0$ and $z=16$ = sum of area of the rectangle R plus the area of triangle T = $320 + 160$
 $= 480$ (Units are \$.)

b) (3 pts) One of the following conclusions from your work in part a is correct (when the answer from a is plugged into the blank space), and the rest are incorrect. Find the correct conclusion, circle it, and fill in the blank with your answer from part a, including units.

Which is true?

~~I.~~ After 16 seconds of processing, the value of the tree goes up by _____.

~~II.~~ The overall change in the value of the whole tree is _____.

III. The value of the first 16 meters of the tree is \$480.

~~IV.~~ A tree of height 16 meters is worth _____ more than a tree of height 0 meters.

~~V.~~ The surface area of a tree 16 meters tall is _____.