1. Michael is a wine grower. He grows red grape vines and
   white grape vines over an area of at least 120 hectares.
   His red grape vines allow him to produce an average of
   32 hL of wine per hectare, while the white grape vines
   generate 25 hL of wine per hectare. At least one-third of
   his harvest will be made up of white grapes.
   Michael thinks he can produce a maximum of
   4000 hL of wine this year.

   Determine the maximum profit that Michael can earn with
   the sale of his annual wine production if his profit is
   $2 per litre of red wine and $1.25 per litre of white wine.

2. Anita and Marcello work at the college radio station. Together, they have to plan to broadcast a
   music show. A college regulation stipulates that they must play at least seven more French
   songs than twice the number of English songs. Anita and Marcello want to play minimum of
   15 songs during the show and their air time allows them to play at most 25 songs. A French
   song lasts an average of 3 minutes and an English song, 3.5 minutes. In addition to the time
   allocated to music, Anita and Marcello will take approximately 15 minutes for commentary.
   Determine the maximum length of their broadcast.

3. Flavie helps individuals and small businesses prepare their income tax returns.
   She has to limit the number of clients in order to keep up with her studies,
   while maximizing her income. She determines that twice the number of individual clients
   combined with the number of small business clients must not exceed 27. Also, she accepts
   at most three more businesses than individuals. She charges $50 to prepare an individual tax
   return and $80 to prepare a small business tax return. Flavie discusses her work load with a
   friend, who helps her realize that she will be a bit overloaded. She decides to limit her total
   number of clients to 12. How will this decision affect her income? Explain your answer.

4. A building engineer has to evaluate the structural integrity of a heritage home that is in danger of collapsing. His mandate is to suggest a renovation plan for the building's structure while taking into account the budget of the organization that owns the building. He calculates that a combination of wooden joists and steel beams would make the building safe, provided that a total of at least 18 supports, including at least 8 steel beams, were added in the basement. Moreover, the engineer knows that the project will be over budget if more than 24 supports are added to the building. The unit price for a wooden joist, delivery and installation included, is $200 and, for a steel beam, is $500.

How much will the optimal renovation plan cost from the point of view of the building owners?