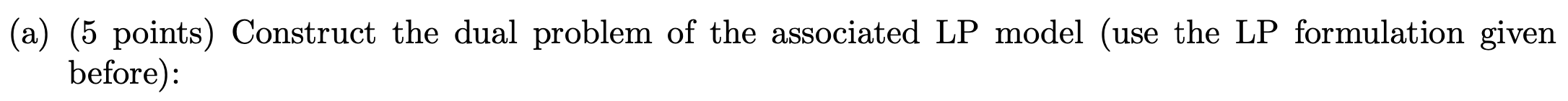
Homework 4

A text on a white background

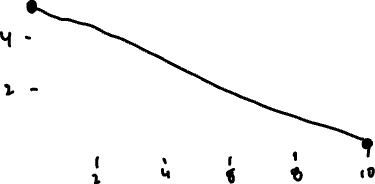
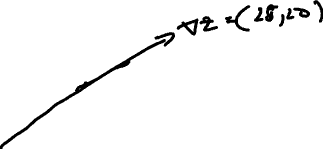
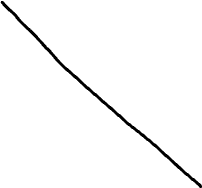
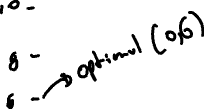
Description automatically generated

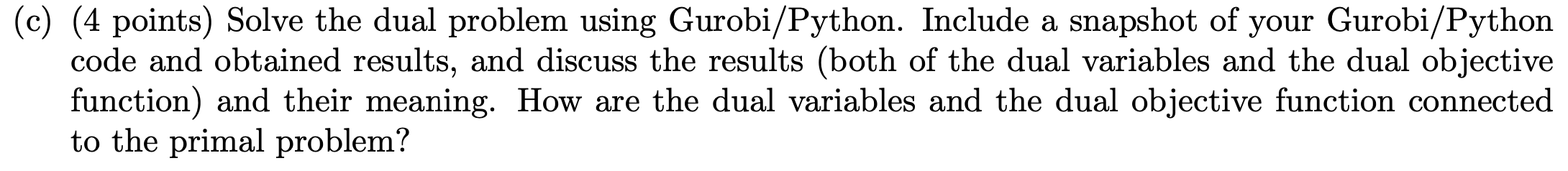




A close-up of text

Description automatically generated



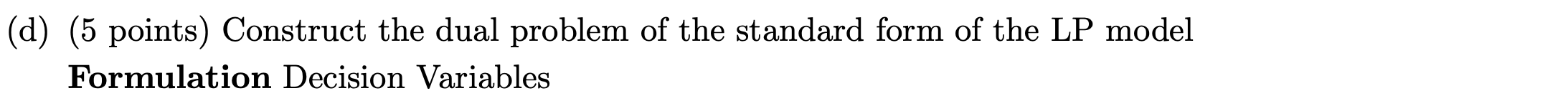


A screenshot of a computer program

Description automatically generated

Dual Objective: The dual objective function value (120 USD) provides insight into the total cost in the dual world, which relates to the pricing of constraints from the primal problem.

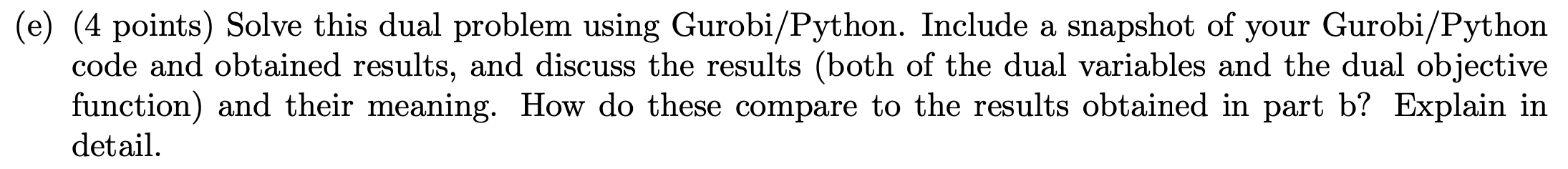
Dual Variables: These represent the marginal values of increasing the resources in the primal. If a dual variable is zero, it means the associated constraint is not binding in the primal problem (additional resources would not improve the objective value).



A math equations on a white background

Description automatically generated





A screenshot of a computer program

Description automatically generated

They are the same results found in part b.

A close up of text

Description automatically generated

Water: The shadow price for water is $6, which is greater than the supplier’s price of $3 per gallon. This means that purchasing additional water would increase profitability by $3 per gallon ($6 value - $3 cost).

Pigments: The shadow price for pigments is $0, which is less than the supplier’s price of $4 per kilogram. This means that purchasing additional pigments would not increase profitability.

Recommendation:

Sooners Inc. should purchase additional water from the supplier, as it will increase profitability. They should not purchase additional pigments, as there is no benefit in doing so (the shadow price is zero, indicating that the pigment constraint is not binding).

A text on a page

Description automatically generated



A table with numbers and a blue rectangle

Description automatically generated

A screenshot of a computer program

Description automatically generated

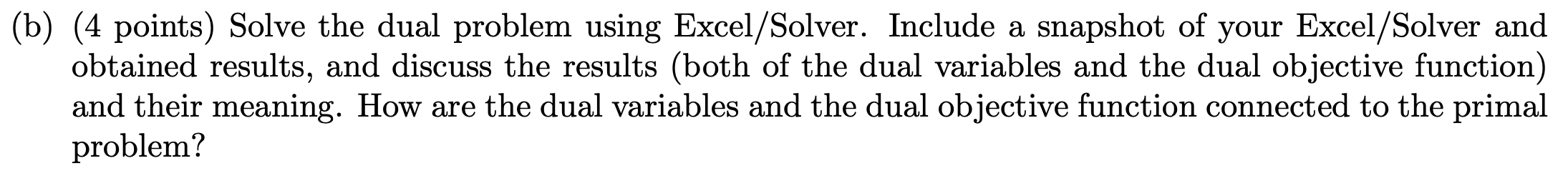
The addition of black paint introduces a new variable that uses fewer resources (water and pigments) per gallon compared to red and blue paints. Since the reduced cost of the black paint variable is negative (-9), black paint will enter the basis, improving the objective function and leading to a new optimal solution, which can be seen in the gurobi result is xr,xb,xk.

A text on a white background

Description automatically generated







A table with numbers and numbers

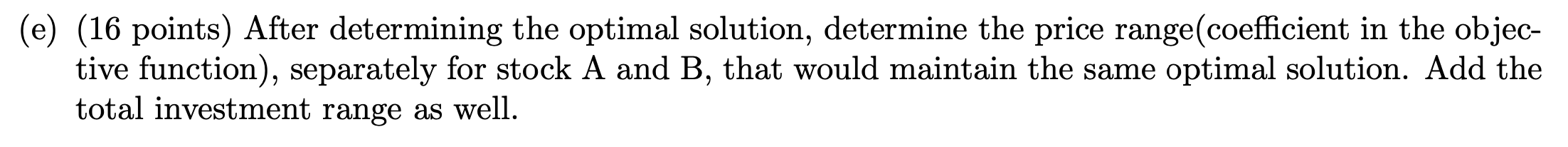
Description automatically generated

A math problem with numbers and equations

Description automatically generated with medium confidence







A screenshot of a computer program

Description automatically generated

A screenshot of a computer program

Description automatically generated

A text on a page

Description automatically generated

A black background with a black square

Description automatically generated with medium confidence

A black background with a black square

Description automatically generated with medium confidence