You are taking "Midterm Exam" as a timed exam. The timer on the right shows the time remaining in the exam. To receive credit for problems, you must select "Submit" for each problem before you select "End My Exam".

End My Exam 2:48:52

Problem 2

Australian Roof Tiles.

0 points possible (ungraded)

Australian Roof Tiles (ART) is a large-scale manufacturer and distributor of specialty roof tiles, based in Australia. Their flagship roof tile - the 'Evercool' - is highly valued for its coolness, impermeability and longevity.

It is a well known fact that the intense Australian sun puts a heavy burden on residential roofs during the summer months. Studies by independent researchers have shown that the use of ART's Evercool tiles can reduce the need for air conditioning in Australian houses during summer.

The Evercool is guaranteed to last fifty years, and will be replaced free of charge in case a problem should arise. Because of these benefits, demand for the Evercool roof tile has grown significantly in recent years.

Production

Production of ART's Evercool roof tiles currently takes place in facilities located in five Australian cities: Shepparton, Brisbane, Sydney, Bowral and Geelong.

Tiles are produced and packed in pallets, with a thousand tiles per pallet. Since the tiles are also sold by the pallet, the pallet (containing a thousand tiles) is used by ART as a unit of measurement for production and demand of tiles.

Each facility has a limited production capacity for the month, based on its area, type of production line and labor available. A production facility cannot produce beyond its capacity. This capacity, for November 2017, is listed below, in pallets of roof tiles per month:

Production Capacity (pallets/month)				
Shepparton	**Brisbane**	**Sydney**	**Bowral**	**Geelong**
32	19	31	23	13

What is the sum of the supply capacity of all five production facilities, in pallets per month?
Give your answer as an integer.

118 ✔

118

Projected Demand

From these five production facilities, ART serves DCs in three cities: Mackay, Port Macquarie, and Traralgon. The DCs in each city have their own monthly demand requirements which must be satisfied. The projected demand, for November 2017, is summarized below, in pallets per month:

Projected Demand (pallets/month)		
Mackay	**Port Macquarie**	**Traralgon**
25	25	47

What is the sum of the demand requirement from all three DCs in November 2017, in pallets?
Give your answer as an integer.

97 ✔

97

Transport

Due to the weight of roof tiles, ART uses trucks for its delivery. It has partnerships with several trucking companies that can carry the products from the five production facilities - all of which have sufficient loading dock capacity for all trucks - to the destination DCs. The transportation costs depend on the point of origin and the destination. When ART delivers the roof tiles *directly* from its production facilities to the DCs, the transportation costs (in AUD per pallet) are as summarized in the table below:

	Transportation Costs (AUD/pallet)		
	Mackay	**Port Macquarie**	**Traralgon**
Shepparton	56	80	56
Brisbane	87	43	75
Sydney	54	51	84
Bowral	46	52	53
Geelong	51	91	77

What is the cost of moving one pallet from Brisbane to Traralgon, in Australian dollars (AUD)?
Round to nearest integer.

75 ✔

75

Submit

✔ Correct

Question 1.

20/20 points (graded)

As the transportation manager of Australian Roof Tiles, your role requires you to find the optimal solution to the problem of transporting the pallets with roof tiles from the different production facilities to the different DCs. The optimal solution should minimize the total cost of transporting the pallets, without exceeding the production capacity of each production facility, and making sure to satisfy the projected demand of each DC. Note that each DC can receive pallets from more than one production facility. Likewise, each production facility can send pallets to more than one DC.

What is the total cost of the optimal solution?

Give your answer in Australian dollars (AUD) for the month of November 2017. Round to nearest integer.

4957 ✔

4957

What is the flow between Brisbane and Traralgon?

Give your answer in pallets for November 2017. If the flow is zero, enter 0 as your answer.

0 ✔

0

What is the flow between Bowral and Port Macquarie?

Give your answer in pallets for November 2017. If the flow is zero, enter 0 as your answer.

0 ✔

0

What is the flow between Geelong and Traralgon?

Give your answer in pallets for November 2017. If the flow is zero, enter 0 as your answer.

0 ✔

0

What is the flow between Sydney and Port Macquarie?
Give your answer in pallets for November 2017. If the flow is zero, enter 0 as your answer.

6 ✔

6

Submit You have used 1 of 2 attempts

✔ Correct (20/20 points)

Anti-mold Coating.

0 points possible (ungraded)
Heavy rains during the fall and spring, and the cool humidity of the winter months, often results in the growth of mold on regular roof tiles. Last year, through a marketing research initiative, ART learned that providing its tiles with anti-mold properties would be highly valued by Australian homeowners.

Over the last few months, ART's research and development team devised a way to make the Evercool mold-resistant: dipping the tiles on a solution with a special additive that is absorbed into the clay and prevents the growth of mold for up to fifty years.

ART can send the pallets with tiles from any of the production facilities to any of three anti-mold coating sites that are available in the cities of Dubbo, Warrnambool and Newcastle. There are no capacity restrictions in these dipping sites: they can treat as many pallets of tiles as ART decides to run through them.

As a result, ART's transportation patterns - and the related transportation costs - have changed. Every pallet of tiles must now be shipped from a production facility to an anti-mold dipping site, and then to the DC. The dipping site cannot hold inventory. There are different costs to transport a unit from each production facility to each dipping site, and from each dipping site to each DC. These costs, in AUD per pallet, are summarized in the tables below.

	Inbound Transportation Costs (AUD/pallet)		
	Dubbo	**Warrnambool**	**Newcastle**

Shepparton	26	32	41
Brisbane	42	43	37
Sydney	44	38	39
Bowral	30	46	25
Geelong	25	36	45

	Outbound Transportation Costs (AUD/pallet)		
	Mackay	**Port Macquarie**	**Traralgon**
Dubbo	18	44	22
Warrnambool	35	25	27
Newcastle	26	42	26

Warm-up Question

What is the cost of moving one pallet from Shepparton through Warrnambool into Traralgon?
Give your answer in AUD. Round to nearest integer.

59 ✔

59

Submit

✔ Correct

Question 2.

20/20 points (graded)

Given the changes, you must now solve this problem again to determine an optimal solution for the shipments that satisfies projected demand and minimizes transportation costs, while respecting the capacities of the production facilities.

Considering both inbound and outbound transportation costs, what is the total cost of the new optimal solution?
Give your answer in AUD, for the month of November 2017. Round to nearest integer.

5047 ✔

5047

What is the flow between the production facility in Sydney and the dipping site in Warrnambool?
Give your answer in pallets, for the month of November 2017. If the flow is zero, enter 0 as your answer.

25 ✔

25

What is the flow between the production facility in Sydney and the dipping site in Newcastle?
Give your answer in pallets, for the month of November 2017. If the flow is zero, enter 0 as your answer.

0 ✔

0

What is the flow between the dipping site in Newcastle and the DC in Port Macquarie?
Give your answer in pallets, for the month of November 2017. If the flow is zero, enter 0 as your answer.

0 ✔

0

What is the flow between the dipping site in Warrnambool and the DC in Mackay?
Give your answer in pallets, for the month of November 2017. If the flow is zero, enter 0 as your answer.

0 ✔

0

Submit You have used 1 of 2 attempts

✔ Correct (20/20 points)