1. **(10 Points)** Personnel department of Arcelik, a company which produces air conditioners, needs to make a production plan for the next 4-months, given the following demand forecast:

<table>
<thead>
<tr>
<th>Month</th>
<th>Demand forecast</th>
</tr>
</thead>
<tbody>
<tr>
<td>September</td>
<td>720</td>
</tr>
<tr>
<td>October</td>
<td>480</td>
</tr>
<tr>
<td>November</td>
<td>920</td>
</tr>
<tr>
<td>December</td>
<td>880</td>
</tr>
</tbody>
</table>

There are currently 8 workers for AC production in Arcelik, and there is no inventory on hand. Due to increasing demand that is forecasted, Arcelik wants to have an inventory of 120 at the end of December.

Each worker can produce 1 AC a day. There are 20 working days in each month. Hiring cost is $200, and firing cost is $400. Inventory holding cost is $20 per AC per month.

a) Determine a mixed plan where Arcelik can hire or fire workers at the beginning of September and at the beginning of November (no backorders allowed).

b) Consider part (a) and that Arcelik can backorder 1 month later for stockouts in September with a cost of $40 / AC.

c) Formulate this problem as an linear program where backorders are allowed in any period.

2. This question is based on the Groundhog’s New Clothes Case.

Eileen has recently received a proposal from a southeastern Asia subcontractor to produced t-shirts for $4.25 each and golf shirts for $7.00 each (overseas freight cost included). The company claims that it can meet Beauti-Phil’s delivery times, and its American customer provided as references support those claims. While researching the company’s product quality and financial viability, Eileen discovered an article on the internet highlighting the fact that this foreign subcontractor has been accused of using child labor in its facilities in the past. The company, according to the article, argues that many children work in this culture, and the wages that they earn provide their families a higher standard of living.

a. **(8 points)** Produce a six-month aggregate production plan for Beauti-Phil Apparel considering the new subcontractor. Summarize the recommended decisions for each month in a table. Describe the procedure applied to produce the aggregate production plans. (You can use linear programming if you like.)
b. **(12 points)** Prepare a brief (not to exceed two pages) memorandum addressed to the Franklins that provides the following:

(i) Identify the stakeholders in the decision choice.
(ii) Propose several possible conclusions that could be reached in response to the workforce issue.
(iii) Determine how each stakeholder will likely be affected by each potential decision.
(iv) In light of the effects of the potential decisions on the stakeholders, identify the most important factors that the decision maker should consider when solving these ethical dilemmas.
(v) Provide your recommendations about the actions the Franklins should take regarding their personnel and the subcontracting proposal.
(vi) Explain why you reject the other viable alternatives that you identified earlier.