1) Suppose that you are currently leasing your office space for $130,000 per year. You have the opportunity to buy the facility for $1.8M. With a 10% down payment, you can get a mortgage for 8% interest per year. You can pay for the down payment from bank account that has been earning you 5% interest per year. Setting aside all other issues, should you lease the facility? Explain (i.e. what are your opportunity costs associated with each option).

With your down payment of 10% or $180,000, your annual interest on the loan will be .08($1.8M - $180,000) = $129,600 which is less than you are paying in rent. However, to get your real opportunity cost, we need to figure in the lost interest from the money you used as the down payment. 5% interest on the $180,000 down payment would be $9,000 bringing your total opportunity cost at $138,600. You should continue to lease.

2) Suppose that a Dentist’s office is located next door to a psychiatrist’s office. The psychiatrist complains of violent screams from next door and that the noise is destroying his practice. He takes the dentist to court to try and get the dentist evicted. If you were the judge and you were interested in efficiency, how would you rule and why?

Efficiency requires that ever asset is allocated to its most valuable use. In this case, we are worried about the allocation of the office space. Clearly, we can’t have both the dentist and the psychiatrist using the space at the same time. Suppose that the psychiatrist earns $800 per day in the office while the dentist earns $1,000 per day. Then the dentist has the higher value use and should be awarded the space.

3) Consider two individuals- Lisa and Mitch. We have the following information about each person’s productivity:

<table>
<thead>
<tr>
<th>Task</th>
<th>Lisa</th>
<th>Mitch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ironing Clothes</td>
<td>4 hours</td>
<td>5 hours</td>
</tr>
<tr>
<td>Washing Clothes</td>
<td>3 hours</td>
<td>6 hours</td>
</tr>
</tbody>
</table>

a) Calculate Lisa’s opportunity cost of ironing clothes and washing clothes

Lisa takes 4 hours to iron a load of clothes. In that time, she could’ve washed 4/3 (1 1/3) loads. Therefore, the opportunity cost of an ironed load is 4/3 of a washed load.

The opportunity cost of washing is the inverse (1 washed load = ¾ ironed load)
b) Calculate Mitch’s opportunity cost of ironing and washing clothes

*By similar reasoning as above,*

*Opportunity cost of ironing is 5/6 of a washed load*

*Opportunity cost of washing is 6/5 of a washed load*


c) Who has the comparative advantage in ironing?

*In Ironing, Mitch has a comparative advantage (lower opportunity cost).*

*Likewise, Lisa has a comparative advantage in washing.*

4) Suppose that we have the following price data

<table>
<thead>
<tr>
<th>Year</th>
<th>Price of Gasoline</th>
<th>Price of Soda</th>
</tr>
</thead>
<tbody>
<tr>
<td>1987</td>
<td>$.89 per gallon</td>
<td>$.35 per 16 oz. bottle</td>
</tr>
<tr>
<td>2005</td>
<td>$2.39 per gallon</td>
<td>$1.49 per 16 oz. bottle</td>
</tr>
</tbody>
</table>

a) Calculate the percentage change in the price of each good.

Gasoline: \[ \frac{2.39 - .89}{.89} = 1.69 \text{ (169%)} \]

Soda: \[ \frac{1.49 - .35}{.35} = 3.25 \text{ (325%)} \]

b) Calculate the percentage change in the *relative* price of gasoline in terms of soda.

<table>
<thead>
<tr>
<th>Year</th>
<th>Relative Price of Gasoline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1987</td>
<td>$.89 / .35 = 2.54</td>
</tr>
<tr>
<td>2005</td>
<td>$2.39 / 1.49 = 1.60</td>
</tr>
</tbody>
</table>

\[ \frac{1.60 - 2.54}{2.54} = -.37 \text{ (-37%)} \]

c) Why do we only worry about relative prices in economics?

Relative prices remove the impact of inflation.
5) Suppose that we have three countries (US, Canada, and Mexico) and two commodities (Tequila and Whiskey). We have the following estimates of productivity. Further, assume that consumers consider Tequila and Whiskey to be perfect compliments (i.e. the two goods are always consumed together – a shot of tequila with a beer chaser!). Hint: we want equal amounts of each produce

<table>
<thead>
<tr>
<th>Country</th>
<th>Tequila (hrs/unit)</th>
<th>Beer (hrs/unit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>USA</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Canada</td>
<td>8</td>
<td>2</td>
</tr>
</tbody>
</table>

a) Calculate the opportunity costs of Tequila in terms of beer for each country. Rank the countries from best to worst in terms of production costs for Tequila.

- Mexico: $\frac{2 \text{ Hours/Tequila}}{3 \text{ Hours/Beer}} = 0.67 \frac{\text{Beer}}{\text{Tequila}}$ (#1)
- USA: $\frac{5 \text{ Hours/Tequila}}{5 \text{ Hours/Beer}} = 1 \frac{\text{Beer}}{\text{Tequila}}$ (#2)
- Canada: $\frac{8 \text{ Hours/Tequila}}{2 \text{ Hours/Beer}} = 4 \frac{\text{Beer}}{\text{Tequila}}$ (#3)

b) Suppose that each country has 100 hours of labor available for production. What will relative price of Tequila be in each country without any trade between them?

*If Tequila and Beer are always consumed in equal quantities, the in the absence of trade, each country must produce both goods. For that to happen, each industry must be equally profitable (relative profits are zero). Therefore,*

- Mexico: $P = 0.67 \frac{\text{Beer}}{\text{Tequila}}$
- USA: $P = 1 \frac{\text{Beer}}{\text{Tequila}}$
- Canada: $P = 4 \frac{\text{Beer}}{\text{Tequila}}$
c) Now, suppose that trade is established between the US, Canada, and Mexico. Sketch out the aggregate supply curve for Tequila.

*With 100 hours available, Mexico can produce 50 units of Tequila, while the US can produce 20 units and Canada can produce 12.5 units. The supply curve adds these quantities as we increase the price:*

![Tequila Supply Curve Diagram]

\[
\begin{array}{c|c|c|c}
\text{Relative Price} & \text{Mexico} & \text{US} & \text{Canada} \\
\hline
0.67 & 50 & 70 & 82.5 \\
1 & & & \\
4 & & & \\
\end{array}
\]

\text{Tequila}

d) What will happen to production patterns when the countries begin trading? (i.e. who will produce what?). Who will be an exporter of Tequila? Who will be an exporter of Whiskey?

*We need to make sure that equal amounts of each good are produced: This means that the US will have to be involved in the production of both goods (if both the US and Mexico are producing Tequila, we will have 70 units of Tequila and only 50 units of beer. If the US and Canada are producing beer, we will have 33 units of tequila and 70 units of beer). For the US to produce both goods, the relative price would need to be 1.*

*At a relative price of 1, Mexico produces and exports tequila, Canada produces and exports beer, the US produces both goods (it’s unclear what the US is importing or exporting)*

e) Which country benefits the most from trade?

*Canada benefits the most (1 is further away from Canada’s opportunity cost of 4 than it is from Mexico’s opportunity cost of 0.67), Canada second most, the US not at all.*