21. [10 points] Before the first Gulf war, Kuwait had the capacity to produce a certain amount of oil from its oil wells. After the war, it found that capacity greatly diminished because the oil wells were on fire. Draw Kuwait’s PPF before and after the war, assuming that the only two goods produced are oil and food. Further assume that setting the oil wells on fire did not affect Kuwait’s ability to produce food. Sketch the PPF before the war and the PPF after the war on the same diagram. Explain why they are different.

When a PPF is drawn, we draw it for a fixed amount of natural resources, along with fixed amounts of the other factors of production such as labor, capital, etc. Fire reduced Kuwait's natural resources temporarily, so the PPF after the war shifted inwards. However, because setting the oil wells on fire did not affect Kuwait's ability to produce food, the maximum amount of food production, the point where the PPF intersects the vertical axis, did not change.
Suppose that an acre of land in Iowa can yield either 50 bushels of wheat or 100 bushels of corn, while an acre of land in Oklahoma can yield either 20 bushels of wheat or 30 bushels of corn.

a. What is the opportunity cost of growing 200 bushels of wheat in Iowa? What is the opportunity cost of growing 200 bushels of wheat in Oklahoma? Which state has a comparative advantage in growing wheat?

It takes 4 acres of land in Iowa to grow 200 bushels of wheat. 4 acres of land in Iowa could be used to grow 400 bushels of corn. So the opportunity cost of 200 bushels of wheat in Iowa is 400 bushels of corn.

It takes 10 acres of land in Oklahoma to grow 200 bushels of wheat. 10 acres of land in Oklahoma could be used to grow 300 bushels of corn. So the opportunity cost of 200 bushels of wheat in Oklahoma is 300 bushels of corn.

Oklahoma has a comparative advantage in growing wheat.

b. Which state has a comparative advantage in growing corn?

If Oklahoma has a comparative advantage in growing wheat, Iowa must have a comparative advantage in growing corn.

c. Suppose that the residents of Iowa eat 200 bushels of wheat and 360 bushels of corn, and that the residents of Oklahoma also eat 200 bushels of wheat and 360 bushels of corn. If there is no trade between the states, how many acres must each state devote to agriculture?

Iowa uses 4 acres of land for wheat and 3.6 acres of land for corn. Total agricultural land use in Iowa is 7.6 acres.
Oklahoma uses 10 acres of land for wheat and 12 acres of land for corn. Total agricultural land use in Oklahoma is 22 acres.

d. In part c, suppose that the states begin to trade, which each specializing in its area of comparative advantage. If the residents of the two states continue to eat the same quantities as before, how many acres of Iowa farmland are freed up for other uses? How many acres of Oklahoma farmland?

If Iowa produces 720 bushels of corn, they use 7.2 acres of land. If Oklahoma produces 400 bushels of wheat, they use 20 acres of land. By trading, Iowa frees up 0.4 acres of land for other uses, and Oklahoma frees up 2 acres of land for other uses.
23 [10 points] SECTIONS 1 and 2
List the factors that change supply and shift the supply curve. Tell what happens to supply and the supply curve when there is an increase in the factor.

The factors are productivity, the number of sellers, expectations, prices of resources and prices of related goods change supply. An increase in productivity, an increase in the price of a complement in production, an increase in expected prices, and an increase in the number of sellers all lead to an increase in supply and a rightward shift in the supply curve. An increase in the price of a substitute in production or an increase in the prices of inputs leads to a decrease in supply and a leftward shift in the supply curve.

23 [10 points] SECTIONS 3 and 4
List the factors that change demand and shift the demand curve. Tell what happens to demand and the demand curve when there is an increase in the factor.

One factor that changes demand is a change in income. An increase in income increases demand and shifts the demand curve rightward for a normal good. An increase in income decreases demand and shifts the demand curve leftward for an inferior good. A change in the price of a substitute or complement also changes demand. An increase in the price of a substitute increase demand and shifts the demand curve rightward while an increase in the price of a complement decreases demand and shifts the demand curve leftward. Expectations, the number of buyers, and preferences also change demand. If people expect their income to increase, or if they expect its price to be higher in the future, or if the number of buyers increases, or if people's preferences for the good increase, demand increases and the demand curve shifts rightward.

24 [10 points] SECTIONS 1 and 2
Suppose that Demand is given by the following equation: \( Q = -P + 60 \), and Supply by the equation \( Q = \frac{1}{2} P \).

What is the equilibrium price and quantity?

At equilibrium, the quantity demanded is equal to the quantity supplied, so

\[
Q_D = Q_S
\]

\[-P + 60 = \frac{1}{2} P\]

add \( P \) to both sides

\[60 = \frac{3}{2} P\]

divide both sides by \( 3/2 \)

\[40 = P\]

So the equilibrium price is $40.
To find the equilibrium quantity, we find the quantity demanded (and the quantity supplied) at the equilibrium price.

Quantity demanded at $40 = -40 + 60 = 20
Quantity supplied at $40 = \frac{1}{2} \times 40 = 20

So the equilibrium quantity is 20.

24 [10 points] SECTIONS 3 and 4
Suppose that Demand is given by the following equation: \( Q = 8000 - 1000P \), and Supply by the equation \( Q = 800P - 1000 \).

What is the equilibrium price and quantity?

At equilibrium, the quantity demanded is equal to the quantity supplied, so

\[
Q_D = Q_S \\
8000 - 1000P = 800P - 1000
\]

add 1000 to both sides

\[
9000 - 1000P = 800P
\]

add 1000P to both sides

\[
9000 = 1800P
\]

divide both sides by 1800

\[
5 = P
\]

So the equilibrium price is $5.

To find the equilibrium quantity, we find the quantity demanded (and the quantity supplied) at the equilibrium price.

Quantity demanded at $5 = 8000 - 1000 \times 5 = 8000 - 5000 = 3000
Quantity supplied at $5 = 800 \times 5 - 1000 = 4000 - 1000 = 3000

So the equilibrium quantity is 3000.