1. (50 points) With the approaching tax cut votes in the US House and Senate, a debate continues over the likely impact of these tax cuts on the US economy. You have been hired as a winter intern at the Congressional Budget Office (CBO), and on your first day of work your boss calls you into her office and points you to an economics blog entry from November 14 written by Paul Krugman, which states:

It’s a sad commentary on the state of affairs in America that we need to spend time debunking the Tax Foundation (TF) “model” of the effects of GOP tax cuts. But that model, with its extremely optimistic take on the growth and revenue effects of corporate tax cuts, is reportedly playing an important role in Senate discussions. So let’s talk some more about a point I’ve been trying to make: if you believe the TF analysis, you also have to believe that the Senate bill would lead to enormous trade deficits — and massive loss of manufacturing jobs.

TF provides very little detail on their model … But if you read in a ways, …. they’re saying that in the long run — which they identify as a decade — the U.S capital stock will be 9.9% bigger than it would otherwise have been. Where do the savings for that increase in capital come from? Since there’s nothing in the bill that would increase domestic savings — on the contrary, the budget deficit would reduce national savings — they come from inflows of foreign capital… Now, it’s just an accounting identity that current account + financial account = 0 — that is, $6.4 trillion in capital inflows means an extra $6.4 trillion in trade deficits over the next decade, more than $600 billion a year. …

As your boss explains to you, she is pretty sure that the CBO is going to be asked to evaluate the impact of the proposed tax cuts on US manufacturing jobs, and she would like you to help her evaluate Krugman’s claim that these tax cuts will lead to a “massive loss of manufacturing jobs” by using the Specific Factors Model and the Heckscher-Ohlin Model to answer a few questions. In answering these questions, you can assume that countries trade freely and that the US imports Manufactures (M) and exports Services (S).

a) Assuming that in the short run the US economy can be represented by the Specific Factors Model, with sector-specific capital and with labor mobile between sectors, and that in the short run the impact of the tax cuts is simply to cause the US to begin running a trade deficit with the ROW, show that if the US is a large economy and the Keynes case is correct, the impact of the tax cut (i.e., the transfer of purchasing power from the ROW to the US embodied in the US trade deficit) will indeed cause a loss of US manufacturing jobs in the short run.

b) Assuming that in the long run the US economy can be represented by the Heckscher-Ohlin Model, with Services (S) the capital intensive good and Manufactures (M) the labor intensive good, and that in the long run the impact of the tax cuts is simply to cause the capital stock in the US to rise, show that if the US is a small economy, the impact of the tax cut (i.e., the rise of the US capital stock) will indeed cause a loss of US manufacturing jobs in the long run.

c) Your boss is also worried about the wages of US workers. If in the long run the US economy is as described in part (b) except that the US is a large rather than a small country, what will be the long run impact of the tax cut (i.e., the rise of the US capital stock) on the real wage of US workers? [You may assume that the rise in US capital stock corresponds to a fall in ROW capital stock of the same
magnitude (so that the world capital stock is unchanged), and that both the US and ROW satisfy all
the assumptions of the Heckscher-Ohlin Model.]

2. (40 points) On November 7, the New York Times ran an article with the headline “China’s Technology
Ambitions Could Upset the Global Trade Order.” The article begins with:

When President Trump arrives in Beijing on Wednesday, he will most likely complain about
traditional areas of dispute like steel and cars. But Washington officials and major global companies
increasingly worry about a new generation of deals that could give China a firmer grip on the technology
of tomorrow.

Under an ambitious plan unveiled two years ago called Made in China 2025, Beijing has designs
to dominate cutting-edge technologies like advanced microchips, artificial intelligence and electric cars,
among many others, in a decade. And China is enlisting some of the world’s biggest technology players in
its push. Sometimes it demands partnerships or intellectual property as the price of admission to the
world’s second-largest economy. Sometimes it woos foreign giants with money and market access in ways
that elude American and global trade rules. …

Such efforts have some American government officials and business leaders calling for a
rethinking of how the United States approaches trade. Lawmakers are pushing for tougher rules on
technology purchases, which do not usually cover the types of deals that China increasingly prefers.
Officials are also investigating whether China is stealing intellectual property. …

Using the Continuum-of-Goods Ricardian Trade Model, with the Home country representing the United States
and the Foreign country representing China, show that (a) there is indeed a range of industries (i.e., goods)
over which the US should be particularly concerned with the protection of the intellectual property (i.e.,
technologies) of its industries, but that (b) there is also a range of industries where the US need not be
concerned because it would be guaranteed to benefit if China’s technology improved over this range.

3. (10 points) A recent study on the economic consequences of Brexit, begins with the following statement:

The United Kingdom is a small open economy with a comparative advantage in services that
relies heavily on trade with the European Union.

Making use of a 3-country version of the 2-good Ricardian Trade Model, with the UK exporting Services (S)
to the EU and the US in exchange for imports of Manufactures (M) from the EU and the US (the EU and the
US do not trade with each other in the 2-good 3-country version of the Ricardian Model, and you may also
assume that the EU and the US have the same technologies), depict an initial equilibrium in which these three
countries are trading freely and the UK is a small country, while the EU and US are both large. Then show that
if the economic consequences of Brexit can be represented as the complete discontinuation of trade between
the UK and the EU (perhaps due to non-tariff barriers that will be put in place between the UK and the EU as a
result of Brexit, but you don’t need to model those), there would be no economic costs to any country as a
result of Brexit as long as the UK is still a small country (relative to the US) after Brexit.

Extra Credit (5 points) Pose a question on a trade policy topic that your grandmother might ask you at the
Thanksgiving dinner table this Thursday, and provide an answer that is supported by the models we have
covered in Econ 39F this Fall but that is translated into words and intuitive statements that your grandmother
could appreciate without having taken Econ 39F herself.
1.a) We are asked to assess the short run impacts of tax cuts on US manufacturing jobs, where in the short run the US economy can be represented by the Specific Factors Model with sector-specific capital and mobile labor and where in the short run the only impact of the tax cuts is to cause the US to run a trade deficit. We are also told that the US trades freely with ROW and the US imports Manufactures (M) and Exports Services (S).

Knowing that the Specific Factors Model is a special case of the Basic Trade Model, we can use the Basic Trade Model to assess the impact of the US trade deficit (a transfer from ROW to US) on \( \left( \frac{M}{S} \right) \), the relative price of Manufactures to Services at which the US and ROW trade. We are told to assume the Keynes case (each country spends a relatively small amount of the marginal dollar on consuming its import good).
The three figures below depict the impact of the US trade deficit on \( \left( \frac{P_m}{P_s} \right)_w \).
Knowing that the US trade deficit will cause \( \left( \frac{P_m}{P_s} \right)^W \) to fall, we may normalize \( P_s^w \) not to change which implies that \( P_m \) will fall. This specific factors graph below then confirms that US manufacturing jobs are lost in the short run.
1. b) We are asked to assess the long run impacts of tax cuts on US manufacturing jobs, where in the long run the US economy can be represented by the Heckscher-Ohlin Model with capital intensive Services ($S$) and labor intensive manufactures ($M$), and where in the long run the only impact of the tax cuts is to cause the US capital stock to rise. We are also told that the US trades freely with ROW that the US imports $M$ and exports $S$, and that we can treat the US as a small country on world markets. The figure below depicts the loss of manufacturing jobs caused by the rise in US capital stock:

![Diagram](image-url)
1. (c) We are now asked to consider what would happen to US real wages in the scenario described by part (b) if the US is a large economy (rather than small, as assumed in part (b)) and if the increase in US capital stock was matched by an equivalent decrease in ROW capital stock so that some of the capital stock just moves from ROW to the US. We can also assume that both the US and ROW satisfy all the assumptions of the Heckscher-Ohlin Model. The figure from part (b) describes what happens in the US at fixed \( \frac{P_m}{P_s} \). The top figure on the next page describes what happens in ROW at fixed \( \frac{P_m}{P_s} \) when ROW experiences a fall in its capital stock of equivalent magnitude to the rise in US capital stock. The bottom figure on the next page then shows what happens to \( \frac{P_m}{P_s} \) in equilibrium: nothing!

Under the assumptions of the Heckscher-Ohlin model, both the US import demand for M and the ROW export supply of M shift out by the same amount. And with no change in \( \frac{P_m}{P_s} \), there is no change...
in W or in r, and so the US real wage is unaffected by the tax cuts in the long run.
The reason that \( (p_m)_{Y^S} \) does not change is that the reallocation of the capital stock from ROW to US does not alter world demand or world supply under the assumptions of the Heckscher-Ohlin Model. Specifically, from the figures we have

\[
\Delta g_{2m}^{\text{ROW}} = -\Delta g_{2m}^{US}
\]

and

\[
\Delta g_{2s}^{\text{ROW}} = -\Delta g_{2s}^{US}
\]

So

\[
\Delta [g_{2s}^{US} + g_{2m}^{\text{ROW}}] = 0
\]

and

\[
\Delta [g_{2s}^{US} + g_{2s}^{\text{ROW}}] = 0
\]

Hence world supplies do not change. And while the reallocation of capital from ROW to US does increase the income of US and decrease the income of ROW by the equivalent amount (i.e., \( \Delta I_{US}^{\text{ROW}} = r\Delta K_{US}^{\text{ROW}} \) and \( \Delta I_{ROW}^{\text{ROW}} = r\Delta K_{ROW}^{\text{ROW}} = -r\Delta K_{US}^{\text{ROW}} = \Delta I_{US}^{\text{ROW}} \)), the Heckscher-Ohlin assumption of identical and homothetic preferences combined with free trade implies that this has no impact on world demand.
2a) We are asked to illustrate a range of goods in the Continuous-Goods Ricardian Trade Model over which the US (home) should be particularly concerned with the protection of intellectual property against inroads from China (foreign). Below we show that the US could be hurt by Chinese technological catchup in the range of goods \( z \in \left[ z_0, z_1 \right] \).

To show that the home country could lose from the drop in \( L^* (z) \) only over the range \( z \in \left[ z_0, z_1 \right] \), as depicted, we need only show that the home real wage falls w/ goods in the range \( z \in \left[ z_0, z_1 \right] \). If these goods are sufficiently
important in the budget chores and hence the CEP, hence will lose. The algebra below shows this: For \( z \in \mathbb{Z}^2_{0,1} \),

\[
\frac{W_0}{P_0(z)} = \frac{W_0}{\overline{W_0} \overline{P_0}(z)} = \frac{\overline{W_0}}{\overline{P_0}(z)}
\]

\[
\frac{W_1}{P_1(z)} = \frac{W_1}{\overline{W_1} \overline{P_1}(z)} = \frac{\overline{W_1}}{\overline{P_1}(z)}
\]

But using \( \overline{P_0}(z) = \overline{P_1}(z) \) for \( z \in \mathbb{Z}^2_{0,1} \) and using the figure to confirm that 
\( W_1 < W_2 \), we may conclude that the home/real wage falls with goods in the range \( z \in \mathbb{Z}^2_{0,1} \).

2.b) We are now asked to illustrate a range of goods where the US (home) is guaranteed to benefit from an improvement in Chinese (foreign) technology. The next page shows that this will be true for the illustrated range \( z \in \mathbb{Z}^2_{1,3,7} \).
When $L^*(z)$ drops only into range $z \in [\bar{z}, \Tilde{z}]$, there is no change in $\bar{w}$ and hence no change in the purchasing power of the home wage $W$ outside of the range of goods $z \in [\bar{z}, \Tilde{z}]$. For this range, we have:

\[
\frac{W_0}{P_0(z)} = \frac{W_0}{w_0} = \frac{\bar{w}_0}{\bar{w}_0} \quad \text{with } \bar{w}_0 = \bar{w}_1, \quad \text{and}
\]

\[
\frac{W_1}{P_1(z)} = \frac{W_1}{w_1} = \frac{\bar{w}_1}{\bar{w}_1} \quad \text{for } z \in [\bar{z}, \Tilde{z}], \quad \text{then have } \frac{W_0}{\bar{P}_0(z)} < \frac{W_1}{P_1(z)}.
\]

Hence, the US (home) is guaranteed to gain.
3. For this question we are told to make use of a 3-country version of the 2-good Ricardian Trade Model, with the UK exporting Services (S) and importing Manufactures (M) from the EU and the US, and with the EU and US having the same technologies. We are asked to depict an initial equilibrium in which trade is free and the UK is a small country. Then we are asked to show that if Brexit can be thought of as a cyclical discontinuation of trade between the UK and the EU, then there will be no cost of Brexit to any country as long as the UK is still a small country relative to the US after Brexit.

The initial (pre-Brexit) and final (post-Brexit) situations are depicted in the upper and lower panels of graphs on the following page, and confirm these points: