### PROBLEM SET #2 Suggested Solutions

**1. Monopolistic Competition (2 points; ½ point per part)**
Let's look back at the midterm question about the effect of a tariff on the U.S. market for Chinese-manufactured plastic toys. Instead of assuming the market is perfectly competitive, let's instead assume the market is characterized by monopolistic competition.

a.   Suppose the U.S. market for Chinese-manufactured plastic toys is initially (before the tariff is imposed) in long run equilibrium. Draw a graph at the right that illustrates this long run equilibrium for the typical U.S. seller. Use subscripts "a" on curves and points.

Note that the ATC curve is tangent to the Demand curve at the profit maximizing quantity. The tangency (rather than intersection) occurs because for $Q>Q_A$, MC>MR which means that for quantities beyond $Q_{A,}$ ATC > AR. (You don't have to be able to explain – or even understand—that logic for Econ 1. But when you take Econ 100A, you will!)
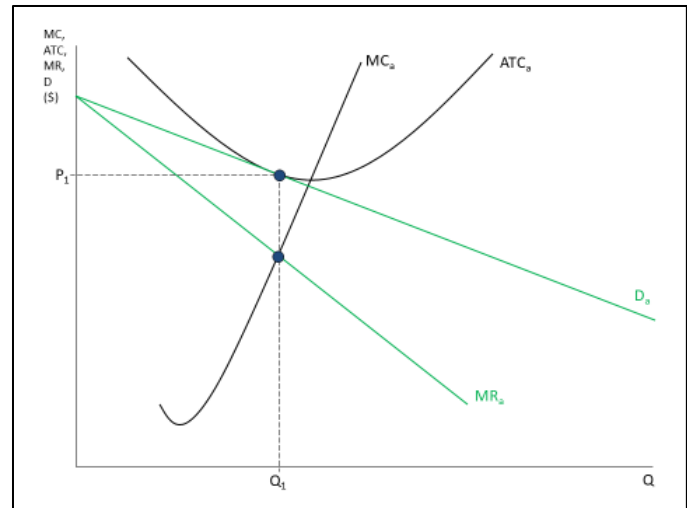
The ATC hits its minimum when it crosses MC. (Again, you can just accept that fact for Econ 1. In Econ 100A, you need to be able to demonstrate why that fact is true.)
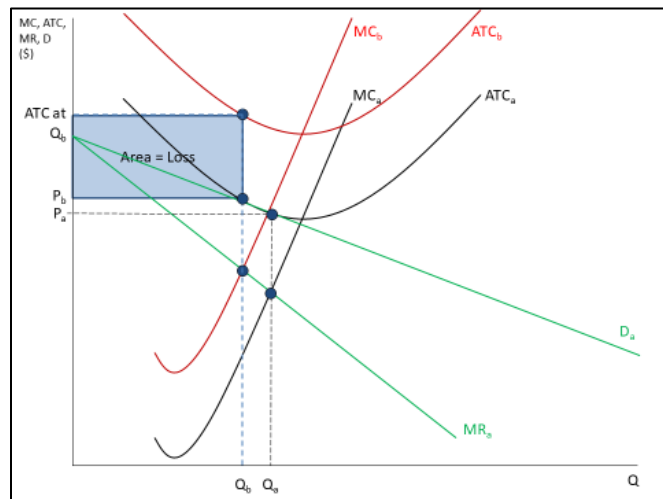
b.   The U.S. government now institutes a tariff. Assume the tariff is a constant dollar amount per toy and is remitted to the government by the U.S. seller. On your graph at the right, show the **short-run** effect of the tariff on the typical U.S. seller. Use subscripts "b." Below, summarize your findings.

Because the tariff (tax) is a constant amount per toy it is a variable cost. The more toys produced, the higher the total tariff bill. So both the MC & ATC shift up by the amount of the tariff.

SR Effect on quantity sold by the typical seller: Quantity sold declines because when the price increases, we move along a downward sloping demand curve

SR Effect on profit of the typical seller: *Profit declines (becomes negative) because the increase in price is smaller than the increase in average costs.*

SR Effect on price of a Chinese-manufactured plastic toy: *Price increases because the seller tries to pass the cost of the tariff along to the customer, but is able to do so only to a limited extent. Price will ultimately be determined by the quantity at which MR=MC.*

c.   Assume the seller depicted in your graph remains in the industry. In the long run, what will be the effect on each of the following? Give a brief defense of each answer.

You weren't asked to draw the graph for part c, in large part because it's very difficult to free-hand draw a shift of MC & ATC, followed by a shift of D & MR that gets the firm to a new long-run equilibrium at which the profit-maximizing quantity (Q_{LR}), determined by the intersection of MR & MC, lines up with the shift of MC & ATC such that the ATC is again tangent to the demand curve at Q_{LR}. Had you drawn the graph, it would look like this:
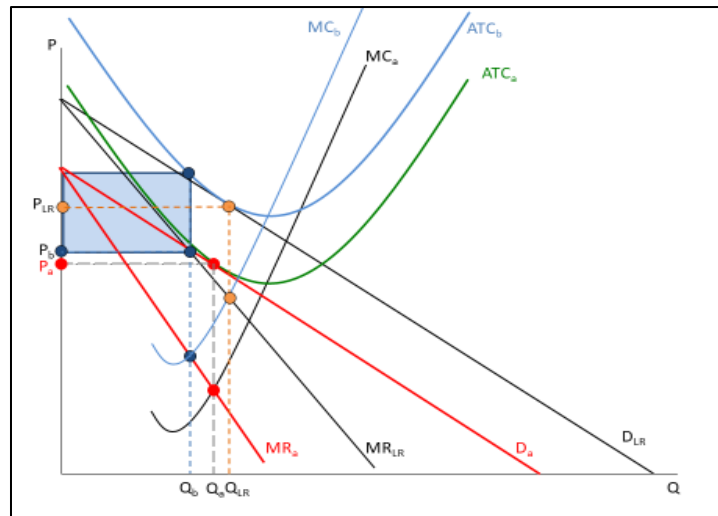
LR Effect on the number of U.S. sellers remaining: *There will be fewer sellers because some firms will have exited following short-run losses.*

LR Effect on demand for each remaining seller's toys: *Each remaining seller will experience an increase in demand, because the customers of the firms that closed will now go to the remaining sellers.*

LR Effect on price charged by each remaining seller: *The price will be higher. $P_{LR} > P_b > P_a$. Price rises in the long run because of the increase in demand experienced by each seller.*

LR Effect on quantity sold by each remaining seller: *The quantity sold by each remaining seller will rise above its short-run level ($Q_{LR} > Q_b$). Without more information we don't know whether Q_{LR} is more than Q_a (as shown here) or between Q_a and Q_b. Quantity sold rises because demand for each remaining seller's toys increases.*

LR Effect on profit of each remaining seller: *Each remaining seller will see its profit return to 0. (Economic profit = 0, which means accounting profit = opportunity costs of labor & (financial) capital.)*

d.   Compare your answers here with the correct answers for the MT question. Any differences between the two sets of answers? What <u>is</u> different in the analysis when you compare this question (monopolistic competition) with the midterm (perfect competition)?

The answers are all the same (price rises in both the short and long run; losses appear in the short run leading to firms exiting; firms exiting results in further price increases, restoring remaining firms to long-run equilibrium with profit = 0. Individual firms sell less in the short run, more in the long run.

One difference is that in monopolistic competition, the firms will never be producing at minimum of ATC and the price will never equal MC.

But the general effects on price, quantity, number of firms – all of those conclusions are the same whether we assume monopolistic competition or perfect competition. And that is why in many principles of economics classes in the US, professors will teach perfect competition only and skip the material on imperfect competition. Not because perfect competition is the most valid assumption about industries, but because whether we assume perfect or monopolistic competition we come to the same bottom line when analyzing the short-run and long-run effect of an increase in variable costs (here), fixed costs (Fall 2017 PS), or demand. Some assumptions matter (that is, some assumptions change the conclusions we come to). Some assumptions do not.

In Econ 100A and beyond, when you start putting actual equations to work because you care about the size (not just the direction) of the effect of a change in costs or productivity or demand or whatever, then the assumption about the form of industry will be important.

2. Externality, Optimal Subsidy (3 points)

Economic analysis relies on assumptions about human behavior. When all economists have the same background, their assumptions will likely reflect their shared background rather than the multitude of life experiences present in society. And when our assumptions are wrong, so too are our models.

In many fields, including economics, evidence indicates that there are role model effects. Who chooses to become an economics major, for instance, is affected in part by who students see as economics professors and professional economists. If students never see a woman economist, fewer women will decide to major in economics. The effect is often subtle, perhaps unconscious. Yet studies have shown role model effects by both race and gender on grades, on likelihood of continuing to the next course, and on completing the major. (Citations will go out by email for those who want to read further.)

So let's consider the market for economics faculty who are women or people of color (briefly, "diverse faculty"). Demand side: Departments hire diverse faculty who will provide a variety of marginal benefits to the department (teaching, research grants, committee service). Supply side: Diverse people with Ph.D.'s seek faculty positions as their career path. Assume (unreasonably, but without much loss of explanatory power) that the market for diverse faculty is perfectly competitive.

a.   Explain why the role model effect noted above is a positive externality from hiring diverse faculty. Be sure your answer uses the relevant economics language.

A positive externality exists when, for some transaction or activity, the marginal social benefit > marginal private benefit. Here we are considering the transaction in which a firm (a department) hires a worker (a faculty member). There are two external benefits to hiring diverse faculty noted in the prompt. (There may be more, but based on the prompt there are two.)

One is that the mix of who majors in a field will change because of role model effects. The average salary of people with an undergraduate degree in economics is higher than that of people with undergrad degrees in most other non-engineering fields (https://www.aeaweb.org/resources/students/careers/earnings). Therefore, hiring diverse faculty, which generates role model effects, which lead some students to major in economics will in turn lead to higher incomes for those students later in life. That is an external benefit – a benefit received by someone other than the department or the faculty member.

The second external benefit comes from the effect on economic research which, in turn, informs economic policy. We've seen that economic models are based on assumptions about human behavior. Sometimes assumptions matter. Changing the assumptions of a model may change the conclusion about the likely effect of a policy. So it matters that the assumptions we bring to our economic research are reflective of the actual behavior of groups within the economy.

Suppose that no one doing economic research had ever lived in a family that was denied access to credit. Then not surprisingly, economic research would assume that people are able to borrow money (obtain credit) when they want credit, so long as they are willing to pay the interest rate the lender is charging. With that assumption, policies about the effect of, say, cutting the generosity of payments made to unemployed people will assume that if those unemployed people find themselves in a tight spot financially, they can just borrow or charge spending to their credit cards or the like. But what if the people who are unemployed are also people who are typically denied access to credit? *Then cutting the generosity of payments to the unemployed might have a much larger effect on the ability of the unemployed to buy food, gas, clothing, and so on.*

We need a diverse set of voices in the room when we are doing economic research so that our assumptions – some of which are implicit, in the sense that we ourselves didn't even recognize that we were making that assumption – are an adequate reflection of the lived experiences of the population. Therefore, the second external benefit is that the policies enacted, which are based on the models developed, which come out of the research conducted, which is based on the assumptions economists make about economic behavior, will be better tuned to the population's actual behavior if there are diverse faculty in the room.

b.   Using the two axes at the right, show (in the top) the short run effect of the positive externality in the market for diverse faculty and (in the bottom) the effect of implementing a subsidy of the optimal size. What determines the optimal size of the subsidy?

Whether the MEB is constant or decreasing as Q increases is up for debate. If there is a role model effect, is it a diminishing effect? Is the marginal effect of the 5th diverse faculty member smaller than the marginal effect of the 1st diverse faculty member? Perhaps. If so, then the MEB would decline as Q increases so the SMB and MB would not be parallel to each other.

Similarly, if the 5th diverse voice in the room has a smaller marginal effect than having the 1st or 2nd or 3rd diverse voice in the room, then again the MEB would decline as Q increases.

How you show the MEB depends upon what assumption you made about whether the MEB is constant or diminishing as Q increases. Here I show the MEB as diminishing as Q increases.

A subsidy of the optimal size will move the market equilibrium (Q₂) to the socially optimal quantity (Qₛ). The socially optimal quantity Qₛ takes into account not only the private marginal benefit (PMB) but also the marginal external benefit (MEB). The sum of PMB and MEB is the social marginal benefit (SMB, or marginal social benefit MSB … you can flip those words around as you wish).

Remember that in labor markets (chapter 9), the demand is the firm or employer's desire to hire workers and the supply is the worker's desire to work for pay (as opposed to not work = "leisure"). The price of labor is also called the wage. So here the demand is the department's desire to hire diverse faculty members, and the supply is the number of diverse faculty who are applying for jobs at each of various wages.

A subsidy paid by the administration can move the market equilibrium to the socially optimal outcome. In the first set of graphs (right), the subsidy is paid to the department and therefore is shown as affecting the demand for diverse faculty by the department. The wage paid to the diverse faculty will be P₂. Because the wage has risen, we
move along the supply curve; the quantity supplied of diverse faculty will increase. The net cost to the department will be "P₂ – subsidy," encouraging the department to hire more diverse faculty. If the subsidy is the right $ amount, the new market equilibrium quantity Q₂ will equal the socially optimal quantity Qₛ.
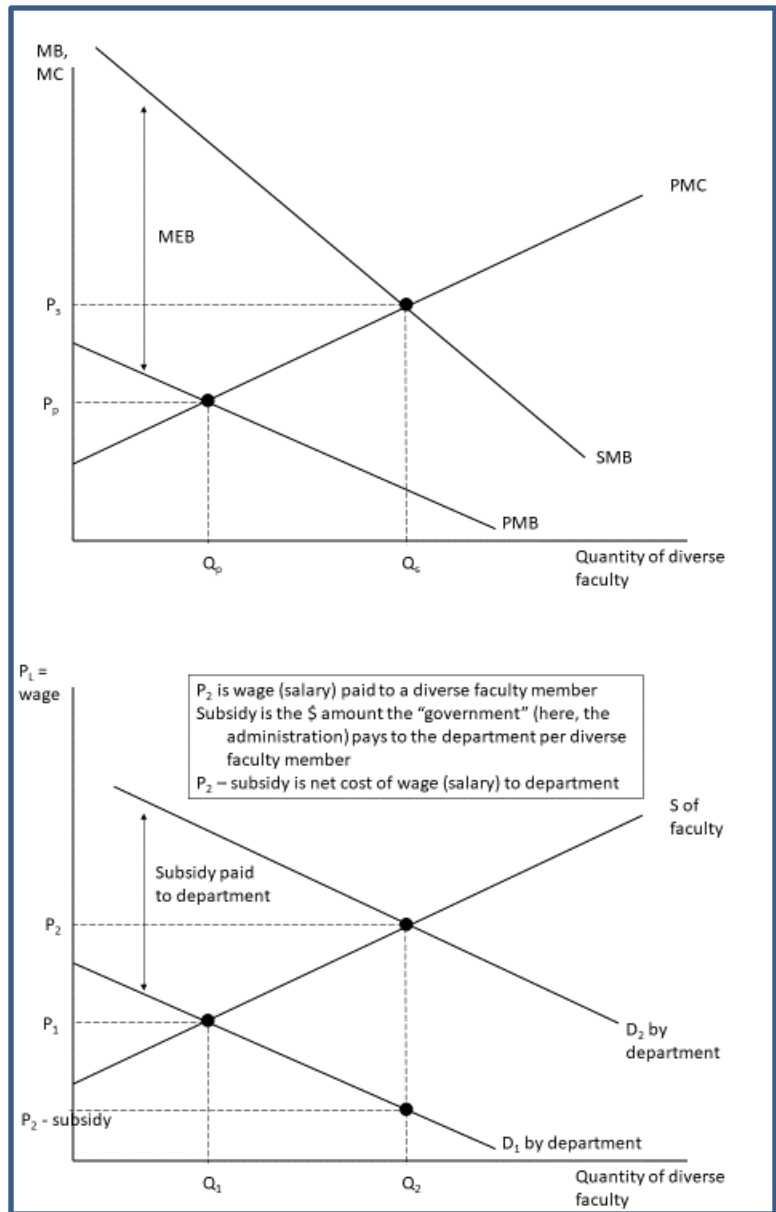
In the second set of graphs (next page), the subsidy is paid by the administration directly to the faculty member and therefore is shown as affecting the supply of diverse faculty. The wage paid to the faculty member <u>by the department</u> will be P₂. The lower wage paid will provide an incentive for the departments to hire more diverse faculty members, moving along their demand curve. The faculty member will receive total income of P₂ + subsidy, which is why more diverse faculty (Q₂>Q₁)

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are incentivized to join the department. If the subsidy is the right $ amount, the new market equilibrium quantity Q₂ will equal the socially optimal quantity Qₛ.

c. Based on your analysis, what recommendation would you make to economics departments (and their deans and provosts) about a strategy that could move the number of diverse faculty in economics toward the social optimum?

The obvious take-away from part (b) is that if the administration (deans & provosts) would provide a subsidy, that will create an incentive for departments to hire additional diverse faculty members. It does not matter if the subsidy is paid directly to the faculty member or to the department. But your recommendation should be consistent with how you drew the effect of the subsidy. If you showed the subsidy as shifting the demand curve, then in this part you should have discussed the administration giving a financial incentive to the buyer, which is the department. If you showed the subsidy as shifting the supply curve, then here you should have discussed the administration giving the financial incentive directly to the seller, which is the faculty member.
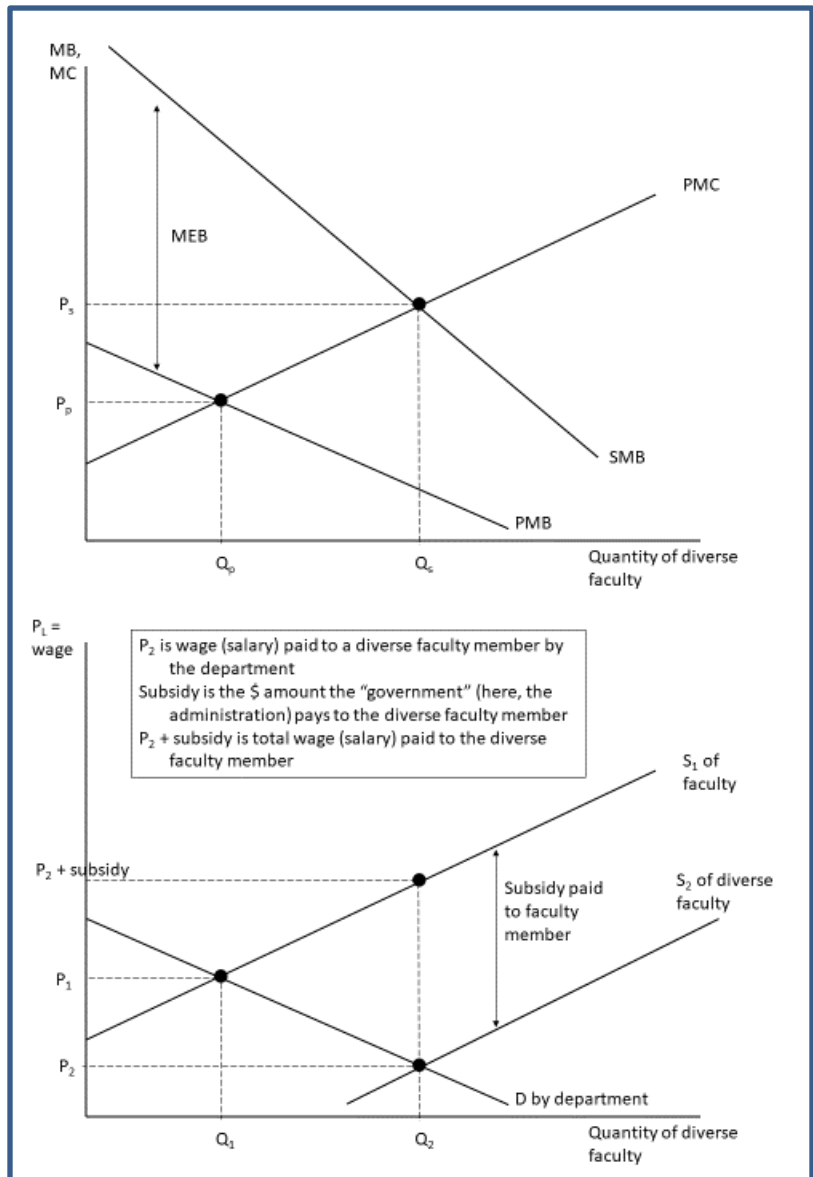
3. Asymmetric Information (2 points)

When an employer reads a stack of resumes of potential employees, asymmetric information problems are present. The employer doesn't know if an applicant will work hard, contribute, be a good team player, or stick with the company. Therefore employers will try to gather information from resumes that might be a signal as to the applicant's future productivity.

P_2 is wage (salary) paid to a diverse faculty member by the department
Subsidy is the $ amount the "government" (here, the administration) pays to the diverse faculty member
P_2 + subsidy is total wage (salary) paid to the diverse faculty member

For example, drawing on the not-so-distant past: It was once standard to include your marital status and the number of children on your resume: "Married, 2 sons (twins, age 6) and 1 daughter (4)." Employers interpreted this signal differently for men than for women. For men, it was often seen as an indicator that he had family obligations and therefore he would be a reliable worker (on-time, few absences, committed to staying with the company). But for a woman, the same information could be seen as an indicator that she would face childcare issues and would therefore be an unreliable worker, often late and prone to absences. So marital status & children was a signal, but the problems with some signals are that they may not be accurate, and are often subject to stereotyping or what is more formally called "statistical discrimination."

a. (½ point) Give an example of information on a resume that you believe an employer currently uses as a signal about the applicant and whether the applicant will work hard, contribute, be a good team player, and stick with the company. To what extent do you think that information is a reliable and accurate predictor of the applicant's ability to work hard, contribute, be a good team player, and stick with the company?

The answers here will vary. You should have cited something from a standard resume (name, school, major, gpa, job

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experience, extra-curricular experience, hobbies, languages, computer skills) and then discussed whether that piece of information is a reliable and accurate indicator of labor productivity. For something to be a "reliable and accurate indicator" means that if you use that information to predict some measure of labor productivity, the prediction has very little error. Putting it in statistical terms, it means that the prediction has a very small standard error.

The issue with resumes is that employers attribute labor market characteristics to applicants based on info on the resume, which may or may not be accurate predictors of the relevant labor market characteristics. A famous article in Economics is entitled "Are Emily and Greg More Employable Than Lakisha and Jamal? A Field Experiment on Labor Market Discrimination." (Bertrand & Mullainathan, American Economic Review, *2004). The answer to their question in the title: apparently yes. In Bertrand & Mullainathan's field experiment, the "white" names received 50 percent more callbacks for interviews. (How famous is this article? According to google scholar, the article has been cited over 3,500 times in other papers or books). https://www.aeaweb.org/articles.php?doi=10.1257/0002828042002561*

In Fall 2015, new policies were introduced in the UK under which names will be stripped off of resumes & college applications: http://www.buzzfeed.com/rossalynwarren/job-and-university-applications-will-hide-names-to-prevent-r#.ig74BDmW7

The problems extend beyond names, of course. Not all graduates of any particular institution are the same, but employers may assume that all applicants from UCB are prima facie better qualified than any applicant from CSUN. Not all economics majors are the same, but employers may assume that all applicants with economics majors have stronger analytical skills than any applicant with a <I'll let you fill in the blank> major.

So, generally, using information off a resume as a predictor of labor productivity is fraught with (statistical) error. (If you haven't taken stats, you really should. It will make a whole lot of econ make a whole lot more sense.)

b.   (½ point) Propose and defend one strategy that employers could use to decrease the information asymmetry and therefore do a better job of more consistently hiring people who will work hard, contribute, be a good team player, and stick with the company.

Again, answers will vary. A good answer would reflect on the answer provided in part (a) but I suppose that wasn't strictly necessary. Whatever your proposal, it should be a strategy that lowers the info asymmetry, providing potential employers with more reliable information about the likely productivity of a hire.

This is what checking references is about. Letters of recommendation lower information asymmetries (it's why LOR should be written by people who know you well, not just by people you like or appreciate or admire). Asking applicants to complete some sort of test can give information about productivity. Back in the 1970s when I (Prof. Olney) worked as a secretary in the summers, I always had to take a typing test when I applied for a job. The score was based on words per minute adjusted for errors.

Again, your specific example varied. But it should have been an example that provided potential employers with more information about the applicant's productivity.

c.   (1 point) Signaling, as in parts a & b, addresses issues of adverse selection. Monitoring addresses issues of moral hazard. Given an example of behavior in the workplace that illustrates the problem of moral hazard. What is a monitoring mechanism in the workplace that effectively mitigates that moral hazard problem? Explain how that monitoring mechanism reduces moral hazard.

Moral hazard, in this context, refers to the problem of employees slacking (or shirking) on the job – not doing the work they are supposed to be doing at the pace they are supposed to be working. There are a variety of monitoring mechanisms employers can put in place. Supervisors can literally watch employees. Computers can be fitted with cameras to use to watch employees. Apps can be used to determine how much time an employee is spending on any website or within any particular program. Customer surveys can be used to obtain feedback about employees. And on and on. Whatever example you gave, you should have included a sentence or two about how it would reduce the opportunity for or likelihood of the

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employee not working when or how they are expected to be working.

4.   (3 points total) Distribution of income

Based on the reader articles (and, if you like, additional work of Berkeley economists Emmanuel Saez (https://eml.berkeley.edu/~saez/), Gabriel Zucman (http://gabriel-zucman.eu/), the Center for Equitable Growth (http://ceg.berkeley.edu/index.html) and the Washington Center for Equitable Growth (https://equitablegrowth.org/)), address these two prompts in an essay.

•   What are the current facts about the distribution of income in the United States? What has changed (and in what way) or not changed with regard to U.S. income distribution over the last 50 - 100 years?
•   (This prompt takes you beyond the reader articles and asks you to think independently.) Think about any topic (that is, any model) we have covered so far this term. Now think about the broad outlines of the distribution of income today compared with, say, the 1970s. In your essay, discuss one way in which the application of that model to a real-world question, or the model itself, might be different if we had also considered the distribution of income.

Remember that in economics (as in life), the conclusions you come to will depend in part on the assumptions you make. So be sure you make any relevant assumptions explicit. Don't invoke wildly unrealistic assumptions; the assumptions you make should be reasonable.

There are many ways you could have gone with this essay, so we can't provide you with "this is what you should have written."

Guidelines:
a.   Did you follow the specifications? One-page essay? Max of 400 words? 1" margins? Double-spaced? 10 or 11 or 12 pt font? Your name and date & word count in the top right corner? Your essay stapled at the back of your problem set? Attached your "works cited" list (either at the end of page 1 or on a separate page)? Submitted both via bCourses & in hard copy?

If so, you remained eligible for full credit. If not, you lost 1 point right off the top.

b.   Did you include a paragraph that summarized the facts about distribution of income?

You could have gleaned this information from the article in the reader, at a minimum. You also may have referenced the additional sites listed above.

c.   Did you discuss any model we've covered and how it might be different if we considered income distribution?

There are many possibilities here, so it's impossible to say "you should have written exactly this." For instance, coming up in the reader is an article about how the marginal propensity to consume (MPC) may be different for high income versus low income individuals. That fact tells us that a policy that provides a tax break to high income individuals will have a different effect on the economy than the same tax break provided to low income individuals. As the income distribution becomes more skewed toward higher income, the same size tax break delivered to the overall economy will have a smaller aggregate effect.

Or you could have considered the effect of a tax on behavior, when the tax is implemented to address a negative externality. If high income individuals have relatively price inelastic demand at the current price, then adding a tax is unlikely to change their behavior (quantity demanded). But the same tax added to the price of the same good might have a larger effect on the quantity demanded by low income individuals. So if we want to force individuals to internalize the externalities associated with driving, for instance, a "one size fits all" tax will have a disproportionately large effect on low income individuals. Perhaps a policy maker wanting to discourage driving/address climate change would therefore want to implement a policy that scaled the penalty (tax) by the income of the drivers.