Question 1

a) The immediate impact on Norway's nominal GDP will be an increase by 3% (= 30% × 10%) **if all others are kept constant**, but for real GDP, it will remain unchanged as the quantity of oil produced is not immediately changing.

b) If the high oil price is sustained for several years, this will induce Norway to produce more oil. We might also expect more investment in the oil patch - likely required to produce more oil. **If this is not offset by any declines elsewhere**, nominal and real GDP would both rise.

d) Whenever foreigners purchase Norwegian goods, services or assets, they supply foreign currency to the foreign exchange market and demand, in return, Norwegian krone with which to pay for their purchases. The higher world oil price means that the world's consumers are offering more foreign currency per unit of Norwegian oil exports. The increase in the supply of foreign exchange occurs even if the volume of Norwegian oil exports is unchanged; if Norwegian oil exports increase in response to the higher world price, the supply of foreign exchange increases further. The increase in the supply of foreign exchange shifts the supply curve to the right and causes a reduction in the exchange rate (**where we define the exchange rate to be the Norwegian krone price of one unit of foreign currency**) — an appreciation of the Norwegian krone.

e) It is important to realize that the exchange rate is simply a price and, like changes in the prices of other goods, a change in the exchange rate will typically be good for some people and bad for others. The question relates to a rise in oil price and thus an appreciation of the Norwegian krone. The appreciation is good for those who are buying foreign goods, as the stronger krone implies a lower Norwegian-krone price of foreign goods. An appreciation of the Norwegian krone is bad for anybody who wants to sell goods, services, or assets to foreigners because the strong Norwegian krone makes these products more expensive in the eyes of foreign buyers. This will hurt other export-oriented industries, for example, the salmon industry, as these products will become less competitive. It will also lead to the so-called **Dutch disease**: a resource boom (i.e, a high oil price here) will detrimentally hurt the manufacturing sector through two channels:

1. Draws inputs (e.g. labour, capital) from the manufacturing sector to the resource sector. The increase in demand for, and price of, these inputs makes the manufacturing sector less competitive.

2. When both resources and manufactured goods are exported, then an increase in the export value of resources appreciates the domestic currency and makes manufacturing exports less competitive.

When the resource boom ends, or the nonrenewable resource gets exhausted, it becomes difficult to revive the manufacturing sector and regain its lost export markets.

f) The rise in oil price is **certainly** good for real GDP in the **short and medium run**, and maybe even the long run, even though the Dutch disease means that other sector exports are crowded out by the appreciation. But **maybe**, depending on the nature of long-run growth, there is a negative impact on the long-term economic growth, because manufacturing is thought to be better as a **long-term engine of economic (GDP) growth** as it is a more dynamic sector that has larger scope for

- economies of scale
- technological progress
- learning-by-doing
- improvements in product design or quality
- backward and forward linkages with the rest of the economy.

But it should be noted that these are **possible but not certain**.

c) Credited to **Aftab Ahmed, Megan Warsame and Harshini VN Ramesh**: well explained!
Answer: If the high oil price is sustained for a few years or longer, it would likely lead to an increase in the aggregate consumption and investment levels. The sustained high oil price would result in increased revenue for the country's oil sector, resulting in higher disposable income for households – which would likely lead to an increase in consumption. Additionally, the increased revenue could also lead to increased government spending, which would indirectly stimulate consumption. The increased revenue from the high oil prices would likely lead to increased investment in the oil sector (Capital "K" investments) as well as in other sectors of the economy. Businesses may invest in equipment and technology to increase productivity and expand their business operations. The government may also invest in infrastructure projects – further stimulating economic growth.

Question 2

a) If consumers become pessimistic about the future state of the economy and about their own employment prospects, then consumption expenditure will decrease, as people will consume less and save more in fear of a future downturn so that they can smooth their consumption over time. As consumption declines, it is also likely that **inventory investment will rise in an unplanned way (more unsold stuff)**. It is also possible that imports will decrease as fewer goods and services are needed.

b) If the fall in consumer confidence lasts considerably longer, consumption and imports are likely to continue to fall, and investment expenditures on new plant and equipment as well as residential construction would also decrease, as firms will be less likely to get the expected future returns if they make some current investments, and individuals will be less certain of their ability to pay off their mortgages on time. When this lasts longer, government purchases may go up, as government will mostly likely step in and boost the economy.

c) This is **not a causal relationship**. An increase in imports does not necessarily lead to a reduction in real GDP – we need to know why imports change in the first place. Perhaps there is an overall rise in real GDP and this leads households to demand more imports. In this case, both real GDP and imports will rise together (although we would also want to know why real GDP increased).

Remark 1. *We cannot say that* ***a rise in any one of the right-hand-side variables of the accounting identity*** *will lead to an increase in real GDP. What we can say is that whatever changes occur in the economy must satisfy this accounting identity, so that the change in the total GDP must be equal to the sum of the changes in the four expenditure components.*

d) *There is no doubt that a storm is bad and causes substantial damages, but I think the question mainly asks you whether the reconstruction spike after the storm will increase GDP or not.*

The subsequent re-construction for damaged property after large storms hit would increase the demand for building materials, which will lead to more expenditure on these products. If this increased demand leads to an increase in the production of such goods, and if there is not an offsetting decrease in demand and production for other goods and services, then GDP will increase. However, if some other production is crowded out as labour and other resources are diverted from other uses to the production of the damaged property, GDP could increase but would be by less than the amount expected, or decrease, or even remain unchanged, depending on the relative magnitude of the change.

Remark 2. *You may probably have noticed here that my proposed solutions on the questions of whether GDP increases or not always come with some caveats: "if the others do not change". This is exactly what you were introduced at the beginning of economics the idea of ceteris paribus. So keep that in mind when you try to explain most things.*

Question 6

c) Credited to **Amr Soliman**: no jargon and well explained!
As my income increases, I will spend a portion of this increase on buying goods and services offered by businesses. My spending will increase the income of these businesses in terms of profits to owners and wages to workers. As their incomes increase, they will consequently spend a portion of their increase in income on consuming others' goods and services which will serve as an income for these businesses. This will create an infinite chain of increases in spending; therefore, the overall aggregate spending is larger than the initial increase in spending. The multiplier is calculated by dividing the overall increase in spending by the initial increase in spending.

d)

Remark 3. *The question is asking for an assumption. Most of you are referring to the marginal propensity to consume (MPC), but MPC is a slope and typically remains constant, not an assumption. So you really have to talk about what assumptions are required. For example, you can mention consumption behaviour, whether consumers are short-sighted or forward-looking. In addition, you can assume that there is no tax, so all the income is disposable income. Otherwise, the tax will affect the size of the multiplier. Moreover, no international trade (or no imports) can be a reasonable assumption, too.*

e) Assuming that the output is demand determined. When spending rises, there will be an increase in demand for products and services. This would send a signal to producers to increase their output. Inventories fall and firms increase production to meet the demand. The output will rise until it equals the desired aggregate spending, which is the equilibrium national income.

Question 3. Credited to Daniel Cruden

a) Individuals' use of digital platforms like Facebook and Twitter do not directly appear in measurements of GDP, because they are not 'market' transactions. Many digital platforms have a business model that involves their services being provided for free (whereas if they charged for the service, it would be picked up). In this sense, digital services are a little like volunteer work – we presume they add value, but because no-one pays directly for them, they are not reflected in GDP. Digital services do involve harms as well which have been documented elsewhere, but these are not material to the question of whether they are recorded in GDP.

   Although individuals' use of digital platforms is not reflected in GDP directly, it is indirectly reflected in advertising revenue that the digital platforms make – other firms pay Facebook and Twitter to promote their businesses on the platform. The value that the advertisers get from this promotion is itself derived from individuals' use of the platforms. Because this transaction is captured in GDP, it can be said that individuals' use of digital platforms *indirectly* appears in GDP. Brynjolfsson and Collis (2020) have cited research that Facebook's advertising revenue is very small when compared to estimates of the consumer surplus Facebook's services generate in the United States and Europe, so it could be argued (as they do) that advertising revenue gives an incomplete picture of how much consumers value the service. A similar issue applies for any good that is traded outside markets – to return to the volunteer labour example, there is likely to be no revenue generated at all, even indirectly, from someone volunteering, meaning that the person or entity that receives the volunteer services will make a lot of surplus off the transaction that has not been captured.

   Given this, it is true that individuals' use of digital platforms is not directly captured by GDP. However, the presence of advertising revenue for those platforms does give a substitute source of revenue which is picked up – a fact that does not apply to some other omissions from GDP.

b) GDP is designed to measure value in monetary terms as it relates to goods legally traded in markets. By necessity, this excludes 'home production' as it is labour that is not exchanged through a market. This exclusion constitutes a weakness as it relates to measuring the amount and nature of labour performed within an economy, or distributional questions about who performs that labour. Unpaid labour is relevant to those questions and GDP does not tell you anything about it.

   It would potentially be possible to respond to this deficiency by adding unpaid labour into measures of GDP. Practical challenges would include whether there needs to be a boundary drawn as to what constitutes labour, and how it gets valued (these are challenges GDP overcomes by simply measuring what is recorded in markets). Adding

unpaid labour would also introduce a serious impediment to our ability to compare across years before and after the addition.

The more fundamental issue, however, is whether changing GDP to reflect unpaid labour makes it a 'better' measure. As noted above, the omission does make GDP a bad measure for the value of unpaid labour. However, GDP as it is currently formulated does a good job of the (arguably narrower but still important) thing it was designed for – measuring the monetary value of goods and services recorded in markets. Adding unpaid labour to GDP would detract from its ability to do this. A better alternative would be for policy makers (and people discussing public policy) to be more careful about when they bring GDP into consideration for policy problems, and when they use other measures that incorporate non-market labour as well.

c) As a result of this government legislating to increase the standard workday, you would expect real GDP to increase, reflecting the increased ability for firms to produce more goods and services. There are two limitations that may restrict the extent to which real GDP does increase (although neither is likely to be enough to stop it from increasing):
    - The diminishing marginal product of labour – it is likely that each additional hour worked will add a diminishing amount of marginal product. While this will probably remain positive, it may end up being less than the marginal wage that firms are prepared to offer (meaning in some cases employers may not take advantage of the new law).
    - Workers with less leisure time may reduce their consumption expenditure relative to before the legislation. In this case consumption expenditure may decrease.

    If we assume that these limitations are weaker than the increased ability of firms to produce output, real GDP should increase.

    This increase is likely, however, to come at the cost of quality of life. We can probably assume that the workers who have to work a ninth and tenth hour as a result of the new legislation would rather not do so at the going wage, given that they were not doing so before it was passed. We can therefore assume that the extra income they earn does not compensate for the lost value of leisure time they experience. The reduced wellbeing of those workers and their families therefore is the 'price' of the increase in GDP the country experiences.

    From an aggregate wellbeing perspective, it is hard to definitively say whether the increase in GDP is worth the reduced leisure of workers. Research on what makes people happy has suggested, however, that things like the ability to spend time with family can sometimes be more important to people that money. The fact that governments very rarely (if ever) have made changes as drastic as the one outlined suggests that most societies would not regard the trade-off contained in this legislation as being worth making.

d) If a government legalizes a previously illegal activity that was nonetheless happening, real GDP is likely to increase because while the activity was illegal it was not recorded in GDP but its legalization brings it into the scope of GDP. The change in real GDP is unlikely to reflect a change in our material living standards if the extent to which the activity is being undertaken has not changed. If the activity becomes more common as a result of legalization our material living standards could be said to have increased, because an activity that society has permitted to be transacted in markets has become more common. It would be hard to know if the activity did become more common because of the challenges inherent in gathering data about illegal activities.

   Sticking with the assumption that the activity starts becoming more common, the question about whether society is better off in a broader sense is more complicated. There are two potential ways of thinking about this. One, more straightforward, frame would be to say that society has permitted the activity to happen, and the people engaged in it are doing so voluntarily, so there is no reason to think anyone is made worse off. Another frame would be to say that the goods or services being legalized are generally not legalized because society has decided they are good, but rather because legalization provides a more effective framework for minimizing the harm that they cause. Under this second frame, what happens to use of the good or service does not in itself tell you anything about whether society is better off with it being legalized – you would instead have to look to other measures (for instance, in the drugs case you could maybe look to see whether drug-related hospitalizations had increased or decreased over time since legalization).