1. You rent a room with a nice ocean view in a house on Del Playa. Last week’s storms severely eroded
the sea cliffs and your friend (the engineering major) estimates that there is a 50% chance that they
will collapse and you will lose all of your possessions, valued at $100. You can sell off some of your
belongings to buy some insurance against this risk, for the price of \( p \) dollars for every dollar of insurance.

(a) Let \( c_c \) denote your wealth if the cliffs collapse and \( c_{nc} \) denote your wealth if they do not collapse.
Write the equation of your state-contingent budget constraint, with \( c_{nc} \) alone on the left-hand
side of the equation.

\[
\text{answer: } c_{nc} = 100 - \frac{p}{1-p}c_c
\]

(b) If your utility of wealth is given by \( u(c) = \sqrt{c} \), what is your \( MRS \)? (Express your answer as if
\( c_{nc} \) is on the \( y \)-axis.)

\[
\text{answer: } MRS = -\frac{\sqrt{c_{nc}}}{\sqrt{c_c}}
\]

(c) Write down a condition that characterizes the optimal consumption bundle, i.e. that you could
use to solve for \((c^*_c, c^*_{nc})\). How much should you spend on insurance when \( p = .5 \)?

\[
\text{answer: You would spend $50 (because } c_{nc} = c_c\text{)}
\]

(d) Now suppose that your utility of wealth is given by \( u(c) = c \). Write your new MRS. How much
insurance would you buy if \( p = .4 \)? If \( p = .6 \)?

\[
\text{answer: } MRS = -1. \text{ If } p = .4, \text{ you spend all you money on insurances, meaning buy } $250 \text{ of}
\text{insurance } (k = 250). \text{ If } p = .6, \text{ you won’t buy any insurance } (k = 0).
\]

(e) Explain what is interesting about your answer to the previous part, and why it happens.

\[
\text{answer: When } u(c) = c, \text{ you are risk neutral, which means that your consumption levels in the}
\text{two states are perfect substitutes and you simply want to maximize your expected consumption.}
\text{Having $1 of insurance gives you an expected payout of $0.50, because there is a 50% chance of}
\text{the collapse. If it costs less than $0.50 to buy a dollar of insurance, e.g. when } p = .4, \text{ you will}
\text{buy as much as you can, because each dollar of insurance increases your expected } c. \text{ On the}
\text{other hand, if it costs more than $0.50, e.g. when } p = .6, \text{ you won’t buy any, because each}
\text{dollar of insurance lowers your expected } c.
\]

2. The inverse demand function for monster burritos at Freebirds is \( p = 35 - \frac{q}{4} \) and the supply function
is \( q = 20p - 100 \).

(a) What is the equilibrium price and quantity?

\[
\text{answer: } p = 10 \text{ and } q = 100
\]

(b) What is the consumer surplus, producer surplus and total welfare?

\[
\text{answer: } CS = 1250, \ PS = 250, \ W = 1500
\]

(c) The city has wants to reduce the number of people that go to Freebirds after 2am and considers
a tax of $15 per burrito. In the new equilibrium, how much would consumers have to pay for a
burrito, how many would they buy, and how would this affect total welfare?
answer: \( p_d = 22.5, q = 50, \) welfare drops by 375, to 1125

(d) Suppose that instead of a tax, the city is considering a price floor. At what level should it set the price floor to achieve the same quantity as the tax? How does the total welfare from the price floor compare to that from the tax?

answer: The price floor should be 22.5. This will lead to the same (total) welfare as tax.

(e) If the Freebirds had to choose between the tax and the price floor, which would they choose? What about the consumers?

answer: Freebirds prefers the price floor, consumers are indifferent.