1. Suppose Cush “Bring-it-Home” Cash has a utility function of $U = M^2$, where $M$ is her income. Suppose Cush’s income is $8 and she is offered a bet from a fair six-sided die: If she rolls a 1, she wins $4 and if she rolls anything else (a 2, 3, 4, 5, or 6), she loses $2.

   a. Graph Cush’s utility function, $U = M^2$ and label it $U$. This represents Cush’s utility if her income is certain.

   b. What is Cush’s expected INCOME $[E(M)]$ if she takes the gamble? Label this on the x-axis.

   c. If Cush accepts the bet, what is her expected utility $E(U)$ from the gamble? Draw the $E(U)$ chord on the graph and label the $E(U)$ that you calculate on the y-axis.

   d. If Cush turns down the bet, what is her utility with this certain income? Label this on the y-axis.

   e. Does Cush take the bet? Why or why not?

   f. Is this a “fair” gamble? Explain.
g. (continued from previous page) Does Cush take the bet if the bet changes so that if she rolls a 1 or a 2, she wins $4 and if she rolls anything else (a 3, 4, 5, or 6), she loses $2?

h. Is Cush risk averse, risk seeking or risk neutral? How do you know? BE EXPLICIT!

i. True or false and explain: Risk seeking individuals accept all bets.

2. Suppose Dan is a National Football League (NFL) player with a utility function of $U = \sqrt{M}$, where M represents monthly income in dollars.

a. Is Dan risk averse, risk seeking or risk neutral? How do you know? BE EXPLICIT!

b. Suppose Dan has two job offers. The first is an offer to be an NFL quarterback. With this job there is a 0.5 probability of earning $16,900/month (if he starts every game), and a 0.5 probability of earning $4,900 (if he gets hurt and sits on the bench all year). What is Dan’s expected INCOME, E(M), if he takes this new job?

c. Although his expected income is ____________, his actual income if he takes this new job will be either ____________ or ______________. (This may seem simple, I’m just being thorough).
d. (continued from previous page) What is Dan’s expected utility, $E(U)$, if he takes this quarterbacking job?

f. As an alternative, Dan has been offered a job as a TV commentator. This job offers him an income of $10,000/month and he can earn that income next year with certainty. What is Dan’s utility, $U$, if he takes this job?

g. Which job should Dan take? Explain.

h. Graph Dan’s utility ($U = \sqrt{M}$) with certain income and expected utility (the chord). Also label his expected income and certain income on the x-axis and his expected utility and certain utility on the y-axis.

i. Let $t$ be the probability that he becomes a starter on the team and $(1-t)$ be the probability that he sits on the bench. What is the minimum $t$ can be so that Dan should take the new job? Hint: Set up an equation with $t$ and $(1-t)$ in it.
3. Suppose that everybody in Bedrock has a utility function given by $U = \sqrt{M}$. Everyone normally has an income of $10,000, but if they get into a car accident their net income, after accident expenses, falls to $400. Half of the drivers in Bedrock are “good drivers” and have a probability of 0.25 of having an accident. The other half are “bad drivers” and have a probability of 0.75 of having an accident.

a. Suppose that Bedrock residents have access to insurance and can pay $p$ for insurance that would cover their losses in the event of an accident. That is, they can have income of $10,000-p$ whether or not they are in an accident. What is the most “good drivers” would be willing to pay for this insurance?

b. How much would the bad drivers be willing to pay?

c. Rubble’s Auto Insurance Company is unable to distinguish good drivers from bad drivers and, therefore, must charge the same premium to everybody. What is the expected value of claims/payouts? (Hint: consider the probability of each type of driver and the probability that each type of driver is in an accident. Also consider how much Rubble’s has to pay if there is an accident).

d. If Rubble’s Auto Insurance Company sets its premium ($p$) equal to the expected value of claims you found above, will all Bloom County drivers be willing to pay this premium?

e. What is likely to happen in this insurance market and why? Is your answer an explanation for why the government might make car insurance mandatory?

f. Can you suggest ways the drivers might change their behavior once they have car insurance?
4. Sperry Speculator has an investment opportunity that pays 33 with probability ½ and loses 30 with probability ½.

a. If his current wealth is $M=111$, and his utility function is $U = \sqrt{M}$, will he make this investment?

b. Would Wild Wanda, who is a risk seeker, be more or less likely to make this investment than Sperry. No math please, just use intuition.

c. Would Plain Jane, who is risk neutral, be more or less likely to make this investment than Sperry. Again, no math please, just intuition (although it is easy to know by looking at the numbers what Jane would do).

d. Would Sperry make the investment in part a if he has two equal partners (suppose Wanda and Jane invest with him)? In this case, the gains or losses are split equally among the three partners.

e. What is the advantage of pooling risk, as in part d?
5. Ross has $10,000 in income and \( U = \sqrt{M} \) is his utility function. His sister Monica offers him a bet where if the fair coin comes up tails, he loses his entire $10,000. What is the minimum amount that she would have to offer him in the event of heads to make the bet a good one for him? Set up an equation. On one side, you want the level of satisfaction that Ross receives if he doesn’t bet. On the other side, you want the expression for his expected utility that incorporates his utility if tails comes up and his utility when heads comes up and he has $10,000+X in income. Solve for X.

7. Consider the market for houses. Suppose two different types of houses exist. Type S is a structural sound house and Type F is a structurally flawed house. There are **sixty** Type S houses and **forty** Type F houses. All owners of the structurally sound houses have reservation value $175,000 and all owners of the structurally flawed houses have reservation value $75,000. (Therefore, the owners of the structurally sound houses are not willing to sell their house for a price less than $175,000 and the owners of the structurally flawed houses are not willing to sell their house for a price less than $75,000.)

All potential buyers are willing to pay $200,000 for a structural sound house and $100,000 for a structural flawed house. Assume there are thousands of risk-neutral potential buyers and buyers **cannot** differentiate between a structurally sound and a structurally flawed house.

a. Graphically, depict the supply and demand curves for housing. How many houses are sold in equilibrium and at what price are the houses sold for?

b. If the buyers were risk-averse instead of risk-neutral, how would this affect the supply of and demand for houses? Depict on the graph.