[1] Preferences I

(i) The preference relation of Berkeley football coach is incomplete. Completeness requires that the coach can examine any two lineman, A and B, and decide that either A is at least as good as B or B is at least as good as A (or both). However, if lineman A is bigger and lineman B is faster, then the coach cannot discriminate between them using the relation bigger and faster.

The preference relation of the coach is transitive. To see why, take three linemen A, B and C and assume that A is bigger and faster than B and that B is bigger and faster than C. Then, A is also bigger and faster than C, satisfying transitivity. Note that a preference relation does not have to be complete in order to be transitive.

(ii) Transitivity and monotonicity (more is better) together imply that indifference curves cannot cross. To see why, suppose that two indifference curves did cross, and choose three allocations, A, B and C, such that:

- A lies on the one indifference curve,
- B is the intersection point, and
- C lies on the other indifference curve and to the right and above allocation A.

Note that A is at least as preferred as B (according to the first indifference curve) and B is at least as preferred as C (according to the second indifference curve). But by transitivity, A is at least as preferred as C, contradicting monotonicity. This is illustrated in PR Figure 3.4 (page 73).

[2] Preferences II

(i-iii) The family’s utility maximizing allocation under the current dollar-for-dollar program (budget line 1) is indicated in the diagram attached by point A (spending a total of $500 on housing). Note that under the proposed lump sum program (budget line 2), the family can still choose to consume at point A as it is also available under the proposed plan.
This implies that the family can increase utility by spending less on housing and purchasing more of all other goods. This is reflected by a movement of the utility maximizing allocation to point \( B \). Thus, the family is (weakly) better off (equivalently, never worse off) under the proposed lump sum transfer policy.

More precisely, if the family view housing and all other goods as perfect complements (indifference curves are shaped as right angles), then they are indifferent between the two programs. If the family do not view housing and all other goods as perfect complements (convex indifference curves so the \( MRS \) diminishes along the curve).


(i-iii) All investors like return :-) A risk neutral investor neither likes nor dislikes risk. His utility depends only on the rate of return so his indifference curves are horizontal lines. A risk averse (resp. loving) investor considers risk to be a “bad” (resp. “good”). A typical indifference curve for each type of investor is shown in the diagram attached.

[4] Risk II

(i) A portfolio manager with utility function \( U = \sqrt{T} \) is risk averse. His marginal utility diminishes as payoff increases (concave a utility over money). The utility function of a risk averse decision maker is illustrated in PR Figure 5.3(a) (page 166).

(ii) The portfolio manager’s expected utility from buying $1M worth of XYZ Corp. stock is given by

\[
E(u) = \frac{1}{4}u(2,000,000) + \frac{3}{4}u(500,000) \\
= \frac{1}{4}\sqrt{2,000,000} + \frac{3}{4}\sqrt{500,000} \\
\approx 884
\]

The manager should not purchase the stock because

\[
E(u) < u(1,000,000) \\
= \sqrt{1,000,000} \\
= 1000
\]
The diagram for question 3

Risk
Return
Risk neutral
Risk loving
Risk averse