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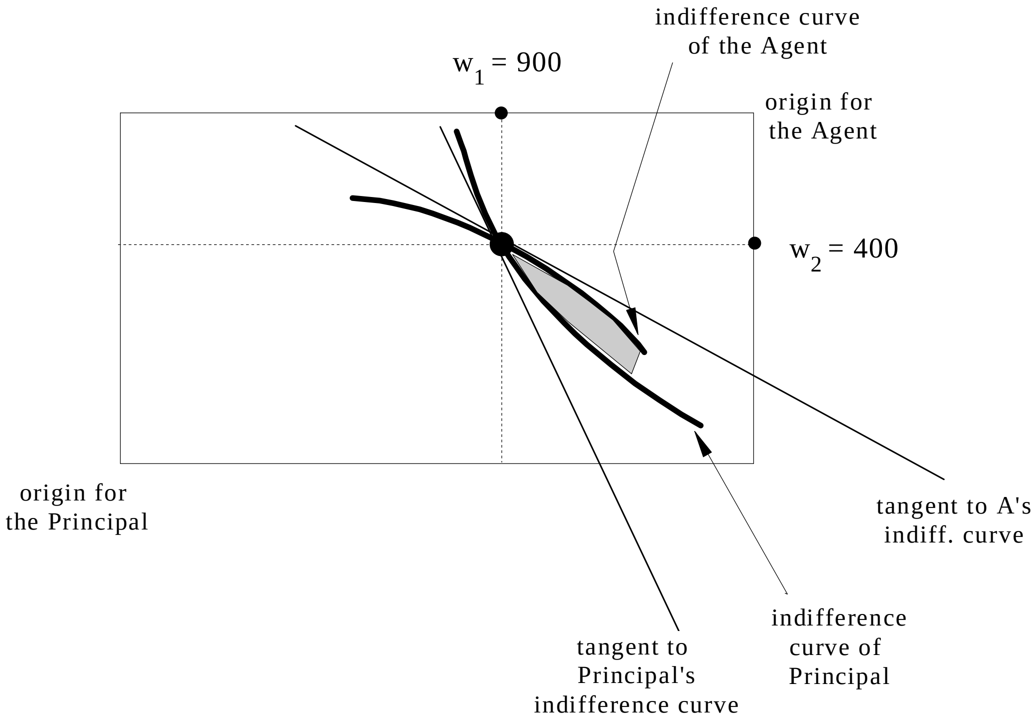
HOMEWORK # 3 ANSWERS

(a) The Principal's expected utility is $p\sqrt{x_1 - w_1} + (1-p)\sqrt{x_2 - w_2} = \frac{1}{3}\sqrt{1,600} + \frac{2}{3}\sqrt{900} = \frac{100}{3} = 33.33$ while the Agent's expected utility is $p\ln(w_1) + (1-p)\ln(w_2) = \frac{1}{3}\ln(900) + \frac{2}{3}\ln(400) = 6.217$.

(b) Pareto efficiency requires that $\frac{U'(x_1 - w_1)}{U'(x_2 - w_2)} = \frac{V'(w_1)}{V'(w_2)}$. Here we have $U'(m) = \frac{1}{2\sqrt{m}}$ and $V'(m) = \frac{1}{m}$.

In this case $\frac{U'(x_1 - w_1)}{U'(x_2 - w_2)} = \frac{\sqrt{900}}{\sqrt{1,600}} = \frac{3}{4} = 0.75$ and $\frac{V'(w_1)}{V'(w_2)} = \frac{400}{900} = \frac{4}{9} = 0.44$. Thus the contract is not Pareto efficient.

(c) The Edgeworth box is as follows:



By risk-aversion, the two indifference curves are convex to their respective origins (thus neither of them is a straight line).

(d) Any contract in the shaded region between the two indifference curves is Pareto superior to contract *C*. Since the Principal's indifference curve at the point representing the contract is steeper than the Agent's indifference curve, a Pareto superior contract would require decreasing w_1 and increasing w_2.
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