Midterm 1, Financial Economics February 15, 2010

Name:
Email: @illinois.edu

All questions must be answered on this test form.

Question 1: Let $S=\{s_1,\ldots,s_{11}\}$ be the set of states. Suppose that at t=0 the state is unknown. At t=1 the person learns whether the the state is in $\{s_1,\ldots,s_5\}$ or $\{s_6,\ldots,s_{11}\}$. At t=2 the person learns whether the state is in $\{s_1,\ldots,s_3\}$, $\{s_4,s_5\}$, $\{s_6,\ldots,s_{10}\}$ or $\{s_{11}\}$. Finally, at t=3 all remaining uncertainty is revealed. *Graph the event tree.* *12 points*

Question 2: For each of the following Bernoulli utility functions determine whether or not the person is risk averse (in all cases $x \geq 0$). *To get credit you need to provide a proof, don't just say yes or no.*

12 points

A) $u(x) = 10x - 4x^4$

B) $u(x) = 4x^2 - 10x^4$

C) $u(x) = 4\sqrt{x} - 10x$

Question 3: Suppose there are four states $S=\{s_1,\ldots,s_4\}$. The probabilities of the four states are given by 0.2, 0.6, 0.1, and 0.1, respectively.
Suppose there are two investments: Investment A results in payoffs 10, 20, 40, 30, while investment B results in payoffs of 20, 10, 100, and 80, respectively, for each of the four states.

A) Suppose that the person's Bernoulli utility function is $u(x)=\sqrt{x}$. Then *6 points*

The expected utility of Investment A is
The expected utility of Investment B is

Therefore the investor will select (*mark the correct answer)* | Investment A | | Investment B |

6 points

B) Now suppose that the Bernoulli utility function is $u(x)=-1/x$. Then

The expected utility of Investment A is
The expected utility of Investment B is

Therefore the investor will select (*mark the correct answer)* | Investment A | | Investment B |

Question 4: Suppose that asset A has a return of 20% with probability 0.5, 10% with probability 0.3 and -10% with probability 0.2.
Suppose a person's utility is $U(\mu,\sigma)= \mu-4\sigma^2$. Then

8 points

the person's utility from asset A is

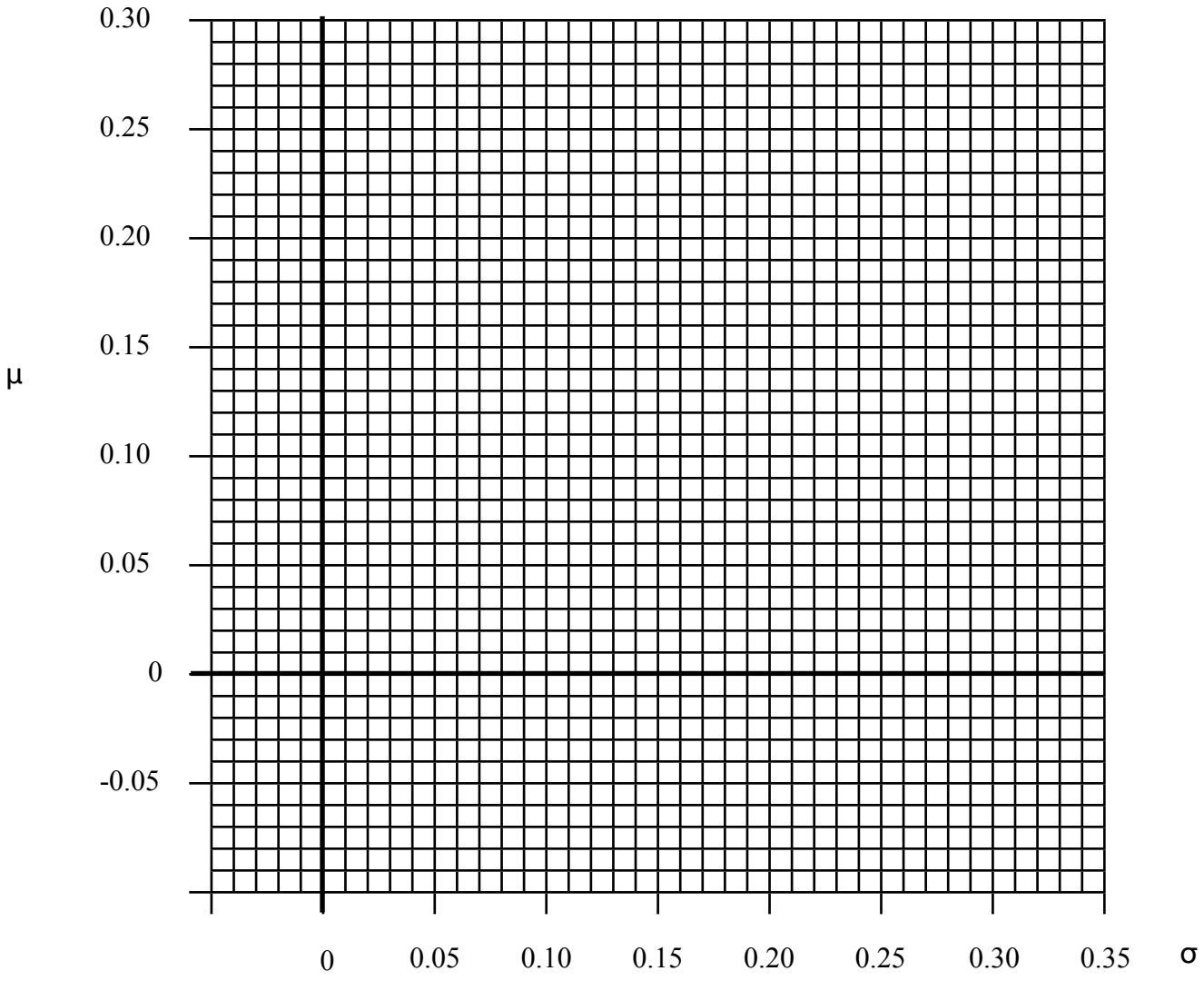
Determine the return of a riskless asset that gives the person exactly the same utility.

the return of the riskless asset must be

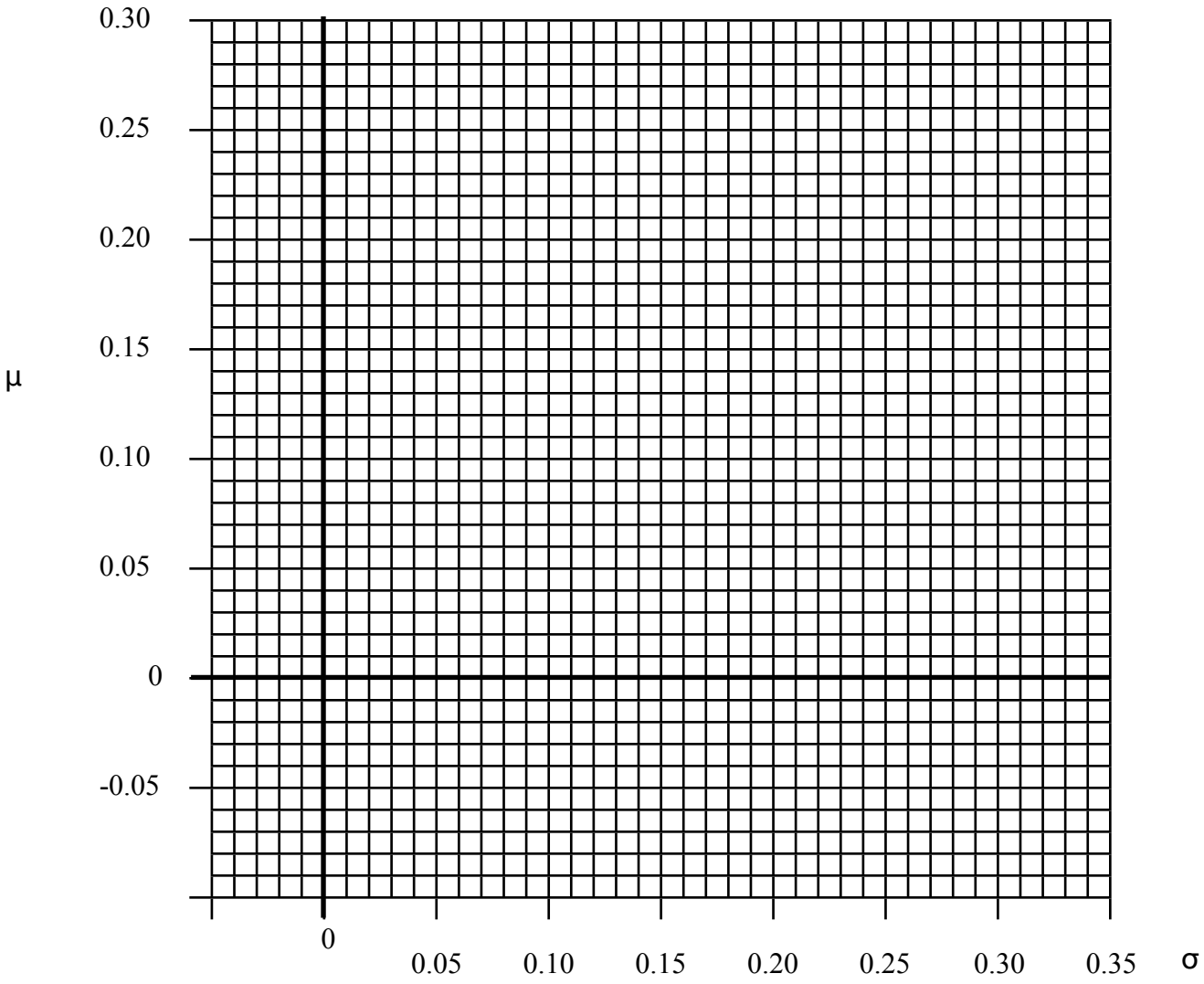
4 points

Question 5: Asset A has a mean return of 20% and a standard deviation of 15% (i.e., μ=0.2 and σ=0.15. In addition, there is a riskless asset that has a return of 10%. Graph the efficient frontier in the grid below:

12 points



Question 6: Suppose there are two risky assets, A, and B. Suppose that $\mu_A=0.1$ and $\sigma_A=0.1$, while $\mu_B=0.2$ and $\sigma_A=0.3$. Suppose that the correlation between the returns of assets A and B is -1. Graph the set of feasible portfolios in the grid below (*clearly indicate the set by shading it).* *12 points*



Question 7: Suppose there is a risky asset, with return 0.4 and standard deviation 0.2 and a riskless asset with return 0.1. The investor has mean variance preferences given by $G(\mu,\sigma)= \mu-0.6\sigma^2$. The person wants to find the optimal portfolio (a,1-a) where a is the fraction of wealth invested in the risky asset and (1-a) the fraction invested in the riskless asset. *14 points*

The optimal value of a is

The mean return of the optimal portfolio is

Question 8: Suppose there are three risky assets A, B, and C. Their returns are $\mu_A=0.2$, $\mu_B=0.3$, and $\mu_C=0.5$. Their standard deviations are $\sigma_A=0.1$, $\sigma_B=0.1$, and $\sigma_C=0.2$. The correlation between the assets is zero. Determine the portfolio (a_1,a_2,a_3) that has the lowest standard deviation (i.e., the MRP). *14 points*

$a_1=$	$a_2=$	$a_3=$

The portfolio's mean return is

The portfolio's standard deviation is