Exam #1 (100 points)

- Take the exam during an *uninterrupted period of no more than 2 hours.* (It should not take that long.) The space provided below each question should be sufficient for your answer, but you can use additional paper if needed. *You are encouraged to show your work for partial credit.* It is very difficult to give partial credit if the only thing on your page is "$x = 3$".
- *Other than this cheat sheet, all you are allowed to use for help are the basic functions on a calculator.* Partial translation: no books, no notes, no websites, no talking to other people, and no advanced calculator features like programmable functions or present value formulas.
- People who have taken the exam can talk to each other all they want, and people who have not taken the exam can talk to each other all they want, but communication between the two groups about class should be limited to three phrases: "Yes", "No", and "Have you taken the exam?"
- For questions or other emergencies, call me at x5124 or 206-351-5719.
- **Expected value** is given by summing likelihood times value over all possible outcomes:

$$\text{Expected Value} \quad = \sum_{\text{Outcomes } i} \text{Probability}(i) \cdot \text{Value}(i).$$

- A **fair bet** is a bet with an expected value of zero.
- The **future value of a lump sum payment** of $\$x$ invested for n years at interest rate r is $\text{FV} = x(1+r)^n$. The **present value of a lump sum payment** of $\$x$ after n years at interest rate r is $\text{PV} = \dfrac{x}{(1+r)^n}$.
- The present value of an **annuity** paying $\$x$ at the end of each year for n year at interest rate r is

$$\text{PV} = x \left[\frac{1 - \dfrac{1}{(1+r)^n}}{r} \right].$$

  The present value of the related **perpetuity** (with annual payments forever) is

$$\text{PV} = \frac{x}{r}.$$

- The **inflation rate**, i, is the rate at which prices rise. The **nominal interest rate**, n, is the interest rate in terms of dollars. The **real interest rate**, r, is the interest rate in terms of purchasing power. These are related by

$$1 + r = \frac{1+n}{1+i}.$$

  When the inflation rate is small, we can approximate this as

$$r \approx n - i.$$