

## Expected Value & Decision Trees

**Expected Value** is a weighted average of possible outcomes of a chance event. Consider the purchase of a one year, million dollar, "term" life insurance policy. You are young and in very good health. The premium is \$400 and you expect that your chance of surviving through the year is 2/10,000.

Outcome	A. Probability	B. Net Cost	A x B
Survive	0.9998	-\$400	-\$399.92
Die	0.0002	\$1,000,000-\$400	\$199.92

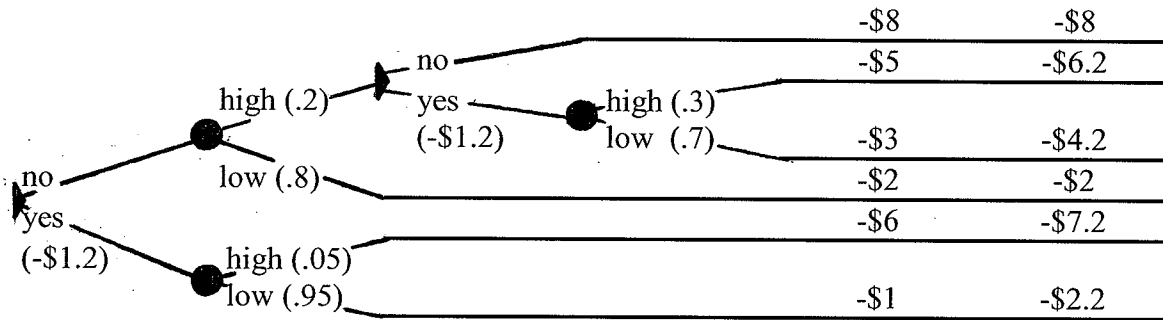
Expected Value -\$200.00

Why might you buy the insurance even though the expected value is a loss of \$200?

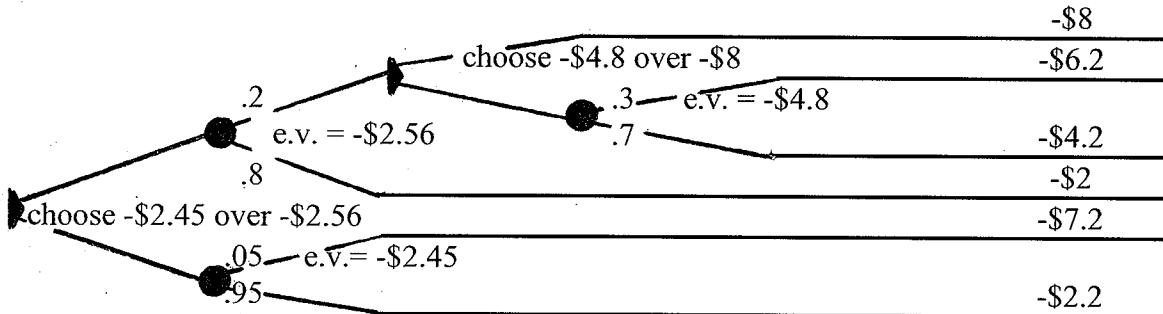
**Decision Trees** are a diagramming of decisions, chance events, and outcomes (in terms of dollars or other measure of utility) that then uses expected value calculations to estimate the average value of each chance event and presumes decisions will choose the most beneficial option. Consider a health department's decision to invest in a campaign of infectious disease prevention.

invest early (\$1.2 million)	incidence (probability)	invest late (\$1.2 million)	incidence (probability)	disease costs (\$millions)	total costs (\$millions)
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### *The Tree*



### *Trimming the Tree* (work from right to left; e.v. is expected value)



So, the choice is to invest early. Any reasons not to do so?