1. **(a)** The information is (1) $P(D)=0.02$ (from which we deduce that $P(\neg D)=0.98$), (2) $P(-\mid D)=0.01$ (from which we deduce that $P(+\mid D)=0.99$**)** and (3) $P(+\mid\neg D)=0.05$. Now, $P(+)=P(+\mid D)P(D)+P(+\mid\neg D)P(\neg D)=$ 0.99 (0.02) + 0.05 (0.98) = 0.0688 = 6.88%.

(b) 2% of 10,000 is 200; thus 200 have the disease and 9,800 don't. Of the 200 who have the disease, 1%, that is, 2 give a negative result; thus the remaining 198 give a positive result. Of the 9,800 who don't have the disease, 5% (that is, 490) give a positive result. Thus the table is as follows:

	positive blood test	negative blood test	Total
have the disease	198	2	200
don't have the disease	490	9,310	9,800
Total	688	9,312	

(c) $\frac{490}{688}=0.7122=71.22\%.$

2. **(a)** Putting the money in the checking account corresponds to the lottery $\begin{pmatrix}\$1,200\\1\end{pmatrix}$, whose expected value is 1,200, while putting it in the mutual fund corresponds to the lottery $\begin{pmatrix}\$1,800 & \$1,400 & \$700\\ \frac{8}{100} & \frac{74}{100} & \frac{18}{100}\end{pmatrix}$ whose expected value is 1,306. Hence Trevor would be risk averse.

(b) The possible levels of wealth are: \$1,800, \$1,400, \$1,200 and \$700. Assign utility 1 to \$1,800 and zero to \$700. Since $\underbrace{\begin{pmatrix}\$1,400\\1\end{pmatrix}}_{CD}\sim\underbrace{\begin{pmatrix}\$1,800 & \$700\\ \frac{1}{2} & \frac{1}{2}\end{pmatrix}}_{startup}$ the utility of \$1,400 is $\frac{1}{2}1+\frac{1}{2}0=\frac{1}{2}=0.5$. Finally, since $\underbrace{\begin{pmatrix}\$1,200\\1\end{pmatrix}}_{Checking}\sim\underbrace{\begin{pmatrix}\$1,400 & \$700\\ \frac{96}{100} & \frac{4}{100}\end{pmatrix}}_{foreign\ venture}$, the utility of \$1,200 is $\frac{96}{100}0.5+\frac{4}{100}0=0.48$. Hence Trevor's utility function is $\begin{matrix}\$1,800 & \$1,400 & \$1,200 & \$700\\ 1 & 0.5 & 0.48 & 0\end{matrix}$

(c) $\mathbb{E}[U(checking)]=0.48$, $\mathbb{E}[U(mutual)]=\frac{8}{100}1+\frac{74}{100}0.5+\frac{18}{100}0=0.45$ $\mathbb{E}[U(CD)]=0.5$, $\mathbb{E}[U(startup)]=0.5(1)+0.5(0)=0.5$, $\mathbb{E}[U(foreign)]=\frac{96}{100}0.5+\frac{4}{100}0=0.48$.

(d) For a risk neutral person we compute expected values. $\mathbb{E}[checking]=1,200$, $\mathbb{E}[mutual]=\frac{8}{100}1,800+\frac{74}{100}1,400+\frac{18}{100}700=1,306$, $\mathbb{E}[CD]=1,400$, $\mathbb{E}[startup]=0.5(1,800)+0.5(700)=1,250$, $\mathbb{E}[foreign]=\frac{96}{100}1,400+\frac{4}{100}700=1,372.$ Thus the ranking is $CD\succ foreign\succ mutual\succ startup\succ checking$.

3.

(a) First we need to convert outcomes into utilities:

	s_1	s_2	s_3	s_4
a	4	6	4	9
b	5	13	3	8
c	11	1	10	0

. Thus the regret table is:

	s_1	s_2	s_3	s_4
a	$\boxed{7}$	7	6	0
b	6	0	$\boxed{7}$	1
c	0	$\boxed{12}$	0	9

where the maximum regret for each act is highlighted.

(b) The MinMax Regret solution is: $\{a,b\}$.

(c) **(c.1)** $H(a,\frac{1}{4}) = 4\times\frac{1}{4}+9\times\frac{3}{4} = \frac{31}{4} = 7.75$. **(c.2)** $H(b,\frac{1}{4}) = 3\times\frac{1}{4}+13\times\frac{3}{4} = \frac{42}{4} = 10.5$.
(c.1) $H(c,\frac{1}{4}) = 0\times\frac{1}{4}+11\times\frac{3}{4} = \frac{33}{4} = 8.25$.

(d) $\mathbb{E}[U(a)] = \frac{4+6+4+9}{4} = \frac{23}{4}$, $\mathbb{E}[U(b)] = \frac{5+13+3+8}{4} = \frac{29}{4}$, $\mathbb{E}[U(c)] = \frac{11+1+10+0}{4} = \frac{22}{4}$
Thus the act that maximizes expected utility is *b*.