1. If she chooses deductible $D$ then she has to pay a premium of $h = 0.2(40,000 - D) = 8,000 - 0.2D$.
   (a) $W_1 = 20,000, \ W_2 = 60,000$.
   (b) The premium is 2,000. Thus $W_1 = 28,000, \ W_2 = 58,000$.
   (c) The premium is 4,000. Thus $W_1 = 36,000, \ W_2 = 56,000$.
   (d) The premium is 8,000. Thus $W_1 = W_2 = 52,000$.
   (e) If she chooses a deductible $D$ then her income will be
   
   $W_1 = 60,000 - 8,000 + 0.2D - D = 52,000 - 0.8D$ if sick
   $W_2 = 60,000 - 8,000 + 0.2D$ if well.
   
   Thus to have $1,000$ more when sick, she must reduce the deductible $D$ by $x$ such that $1,000 = 0.8x$,
   that is by $x = 1,250$, in which case her premium increases by $0.2(1,250) = 250$, thereby reducing her
   wealth in the good state by $250$.
   (f.1) The graph is as follows [the equation is $W_2 = 65,000 - 0.25 \ W_1$]:

   ![Graph](image)

   (f.2) The slope is $-\frac{0.2}{0.8} = -\frac{1}{4} = -0.25$.
   (g.1) The indifference curves are convex to the origin because she is risk-averse.
(g.2) The slope of the indifference curve at point \((w_1, w_2)\) is 
\[- \frac{p}{1 - p} \frac{u'(w_1)}{u'(w_2)} = - \frac{0.2}{0.8} \frac{w_2}{w_1}. \]
Thus at the no insurance point the slope is 
\[- \frac{0.2(60,000)}{0.8(20,000)} = - \frac{3}{4} = -0.75. \]

(g.3) The slope of the indifference curve at the full insurance point is:
\[- \frac{0.2(52,000)}{0.8(52,000)} = - \frac{1}{4} = -0.25, \]
the same as the slope of the zero-profit line.

(h) The optimal choice is full insurance (there is a tangency there of the indifference curve with the budget line):

(i) With full insurance her utility is \(\ln(52,000) = 10.859.\) Without insurance her expected utility is 
\[0.2 \ln(20,000) + 0.8 \ln(60,000) = 10.782.\] Thus her utility increases by 0.77.

2. The values of \(p\) and \(q\) must be such that: (1) \(p + q = \frac{4}{12}\) (the sum of the probabilities must be equal to 1) and (2) \(30p + 80q = \frac{4}{12} 60\) (this comes from setting \(E[L] = E[M]\)). There is only one solution, namely \(p = \frac{2}{15}\) and \(q = \frac{3}{15}.\)