1. Since Paul is risk-neutral and Meg is risk-averse, Pareto efficiency requires that all the risk be borne by Paul, hence Meg should be guaranteed a fixed wage. For the contract to be acceptable to Meg, it must guarantee her a utility of at least 1. A contract according to which Meg gets 1 for sure is Pareto efficient and acceptable to both, because Meg's utility is $\sqrt{1} = 1$ and Paul's expected utility is

$$\frac{1}{4}(1 - 1) + \frac{1}{4}(2 - 1) + \frac{1}{4}(3 - 1) + \frac{1}{4}(4 - 1) = \frac{3}{2} > 1.$$ 

2. At a signaling equilibrium the employer's beliefs must be confirmed. Thus Group I workers must choose $y < a$ (in which case they would choose $y = 0$) and Group II workers must choose $y \geq a$ (in which case they would choose $y = a$). For Group I this requires: $6 > 10 + \frac{1}{2}a - 4a$, while for Group II this requires: $10 + \frac{1}{2}a - 2a > 6$. Both inequalities are satisfied if and only if $\frac{8}{7} < a < \frac{8}{3}$.

3. Let date 0 be the current year. The discounted present value of her income over the next 10 years if she takes the job is

$$\sum_{i=0}^{2} \frac{50,000}{1.08^i} + \sum_{i=3}^{9} \frac{60,000}{1.08^i} = 139,163.24 + 267,817.39 = \$406,980.63$$

If she goes to Law School, then she will start earning from the fourth year onwards and her net salary will be (after repaying her loan) $120,000 - 18,000 = \$112,000$ per year, whose present value is: $\sum_{i=3}^{9} \frac{102,000}{1.08^i} = \$455,289.56$. Thus she should go to Law school.