(c) $X = 2,000$ with probability 0.2 and $X = 12,000$ with probability 0.8.
Mean of health expenses: $E[X] = 0.2 \times 2,000 + 0.8 \times 12,000 = \$10,000$.
Variance of health expenses: $V[X] = 0.2 \times (2,000 - 10,000)^2 + 0.8 \times (12,000 - 10,000)^2$
$= 0.2 \times 64,000,000 + 0.8 \times 4,000,000 = 16,000,000$
Standard deviation of health expenses $=$ S.D.$[X] =$ sqroot$(16,000,000) = \$4,000$.
Standard deviation of average claims $=$ S.D.$[X]$ / sqroot$(N) = 4,000$ / sqroot$(10000) = \$40$.
95 % are within two standard deviations of mean since average is normally distributed.
i.e. ($\$10,000 - 2 \times 40$, $\$10,000 + 2 \times 40$) = (<u>$\$9,920$</u>, <u>$\$10,080$</u>).

2.(i) Yes. It is currently difficult to obtain health care price and quality information.
(ii) Those who cannot get insurance through an employer will have more opportunity to get a
more reasonably priced insurance policy through a private policy due to being in a large pool.
(iii) No. The credit is substantially lower than what insurance policies currently cost.
[This is a sufficient answer. In fact a family policy through employer cost on average $< \$15,000$
in 2014].
(iv) Yes. It doesn't seem that it would replace other money the government is spending.
For every 10 million families the credit is $57 billion more in government spending.
(v) The Ryan plan has no individual mandate to have insurance, unlike President Obama's plan..
(vi) This is harder though there are many possibilities. No mention of expanding Medicaid
coverage, or creating a cost-effectiveness institute, or lowering Medicare and Medicaid
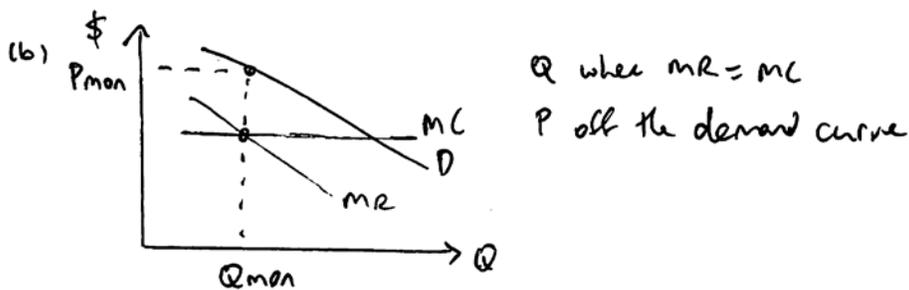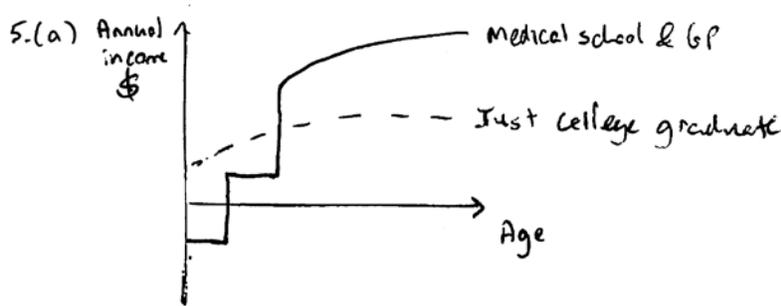reimbursement rates.

3.(a) For passive versus aggressive: MC per marginal QALY saved = ($100,000-
$40,000)/(10×0.6 -5×0.5) = $60,000/3.5 = $17,143.
It's cost effective if we feel a QALY is worth at least $17,143.
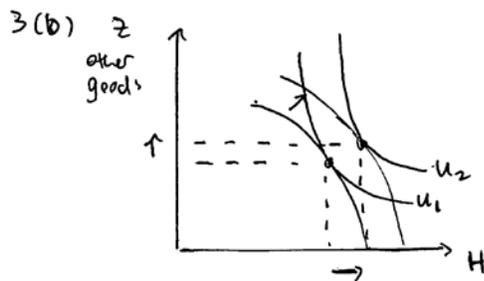
(c) $U = U(H, Z)$ Utility is a function of Health capital and consumption of other goods
     $H = H(M)$ Health capital is produced by medical goods and services M
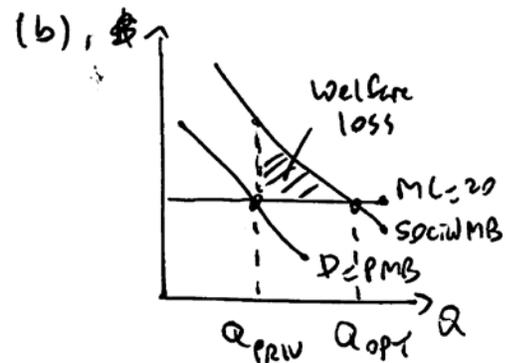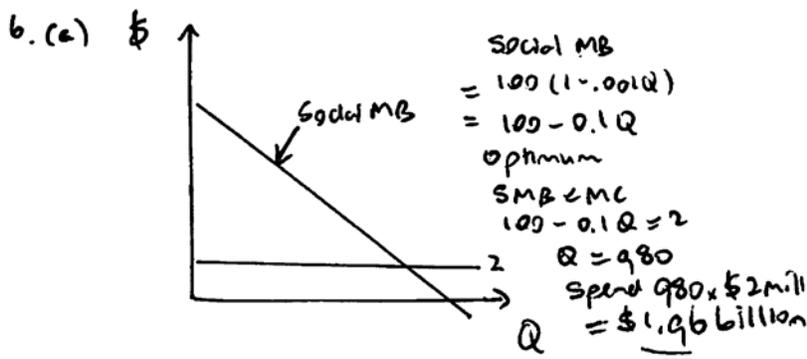 $I = p_z Z + p_m M$ Budget constraint   Income = other goods spending + health spending.

4.(a) False. Order is hospital, physician, pharmaceutical.

(b) True.   As detailed in class EPA uses $9 million and FDA $8 million.

(c) False. The insurer pays 60%. The coinsurance rate is 40%.

(d) False. The patent is filed and granted well before Phase III drug trials.

(e) True.   Utilization rates are slightly lower in the U.S. Costs are much higher.

(f) False.   Life expectancy in 2015 is calculated using 2015 mortality rates in each age group.

5.(a) Annual income $ — Medical school & GP — Just college graduate — Age

(b) $ P_mon — MC — D — MR — Q_mon — Q

Q when MR = MC
P off the demand curve

5.(c)(i) A prospective payment system pays providers a fixed amount for treatment of a health condition, such as a tonsillectomy, regardless of how much it costs the provider to perform the treatment.

(ii) Capitation is a fixed payment to provider per person insured. E.g. payment per member per month.

6. (a) $
Social MB
$= 100(1-.001Q)$
$= 100 - 0.1Q$
optimum
$SMB < MC$
$100 - 0.1Q = 2$
$Q = 980$
Spend $980 \times \$2$ mill
$= \$1.96$ billion

(b) $
Welfare loss
$MC = 20$
Social MB
$D \leq PMB$
Q_{PRIV} Q_{opt} Q

6.(c)(i) Technological change was worth it. For 4 out of 5 interventions MB considerable > MC.

(ii) Government pays for a much greater fraction of health care in the major western European countries compared to the U.S.

7.(a) The elasticity of drug price at launch with respect to life years gained is 0.991. This is obtained from the log-log regression in the second set of output.

(b) This is not given. It needs the command **regress lnprice year**

(c) There is a statistically significant relationship between drug price at launch and drug effectiveness at level 0.05. From the first set of output variable **lyg** has $p = 0.000 < 0.05$. or … From the second set of output variable **lnlyg** has $p = 0.000 < 0.05$.

(d) This adds variable lncomp. Drug price is lower when there is competition from other drugs.

(e) regress price

(f) regress price orphan

Multiple choice

Question		
1	a	
2	c	
3	d	
4	a	Risk-averse benefits from insurance more the greater the variability in outcome.
5	b	Asymmetric information is the key
6	a	
7	a	
8	c	
9	a	
10	b	
11	a	
12	c	
13	d	
14	c	
15	a	
16	a	
17	c	
18	c	

Scores out of 60   **Curve (Indication only: Course Grade is based on Total Score!)**

Average GPA on this curve 2.7

75th percentile	50 (83 %)	A+	56 and above	C+	41 and above
Median	45.5 (76 %)	A	51 and above	C	39 and above
25th percentile	40.5 (68%)	A-	49 and above	C-	37 and above
		B+	47 and above	D+	35 and above
		B	45 and above	D	33 and above
		B-	43 and above	D-	31 and above