MSE 230
Fall 2012
EXAM I

Closed book
(1 sheet of notes, 8.5”x11” writing on both sides, allowed)

Name: _____

Recitation (day and time): _____

Kara Luitjohan
R3 Thur. 10:30
R6 Thur. 4:30

Andrew Kustas
R10 Thur. 9:30
R5 Fri. 10:30

Abhishek Bawiskar
R4 Thur. 1:30
R12 Fri. 11:30

Yuefeng Wang
R8 Thur. 2:30
R11 Thur. 3:30

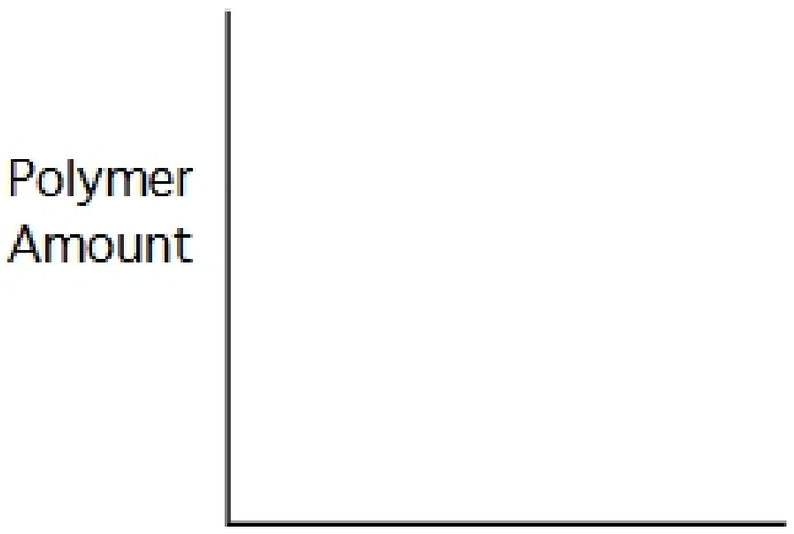
Good Luck!

1	a)	/05
	b)	/05
	c)	/10
	total	/20
2	*total*	/15
3		/20
4		/05
5	a)	/05
	b)	/10
	total	/15
Total		**/75**

(20) 1. Short answer questions.

(5) a) Make a qualitative sketch of the molecular weight distributions for two batches of polyethylene that were polymerized under different conditions. Batch 1 was polymerized such that $\overline{M}_w >> \overline{M}_n$ and Batch 2 was polymerized such that $\overline{M}_w \approx \overline{M}_n$.

Batch 1



Batch 2

(5) b) Match the values of Young's modulus and coefficient of thermal expansion with the appropriate material.

Values of Young's modulus (GPa): 2.7, 115, 304

Coefficient of Thermal Expansion Values ($°C^{-1}$): $3.0*10^{-6}$, $17*10^{-6}$, $120*10^{-6}$

Material	E (GPa)	$\alpha(°C^{-1})$
Copper		____x10^{-6}
Polystyrene		____x10^{-6}
Silicon Nitride		____x10^{-6}

(10) c) Circle either TRUE or FALSE

i: In general, volume is not conserved during elastic deformation. TRUE FALSE

ii: Given the same molecular weight and chemical composition, a polymer composed of linear chains will crystallize more readily than a polymer composed of branched chains. TRUE FALSE

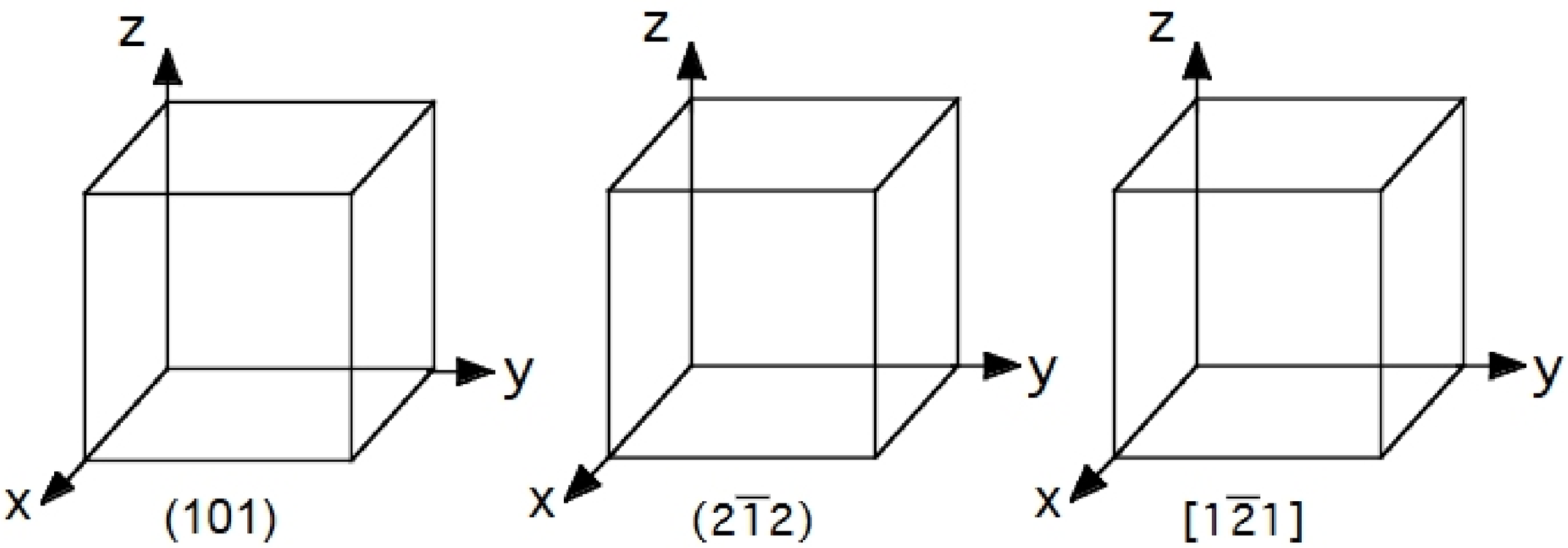
iii: Heating a crystalline metal will cause its x-ray diffraction peaks to shift slightly to the right. TRUE FALSE

iv: The slope at $r=r_0$ of the potential energy vs. separation distance curve is proportional to Young's modulus. TRUE FALSE

v: In a BCC crystal structure the atoms touch along the <111>. TRUE FALSE

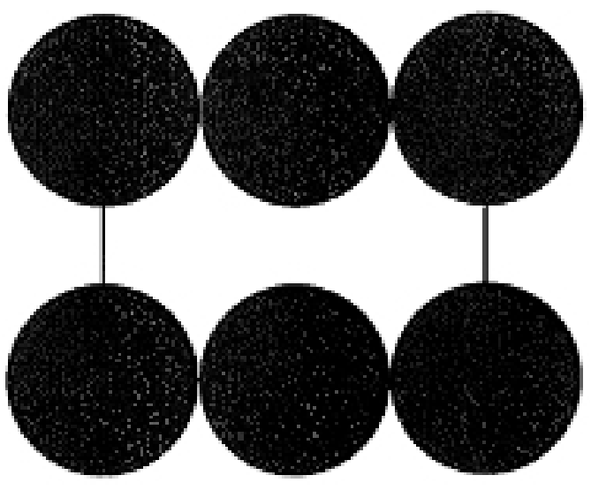
(15) 2. Crystals Structures, Planes and Directions

(6) a) Draw the following **inside** the cubes provided.



(4) b) Please fill in the blanks.

The drawing below shows the arrangement of atoms on the {_____} of a _____ metal.



(5) c) Which of the following are possible slip systems for a FCC metal? Circle your answer(s).

i) $(1\bar{1}1)[10\bar{1}]$ ii) $(1\bar{1}0)[110]$

iii) $(11\bar{1})[\bar{1}01]$ iv) $(1\bar{1}1)[0\bar{1}\bar{1}]$ v) $(10\bar{1})[\bar{1}1\bar{1}]$