Fossum
1A

Answers - Review Problems for Exam 2

1a. u_{rms} depends on temp and molar mass. $\propto \sqrt{\frac{1}{M}}$

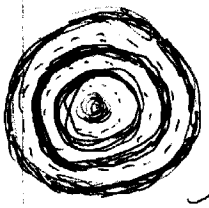
$u_{rms} = \sqrt{\frac{3RT}{M}}$

At the same temp, lighter gas molecules travel faster. So He would have a higher root mean-square speed than CO_2.

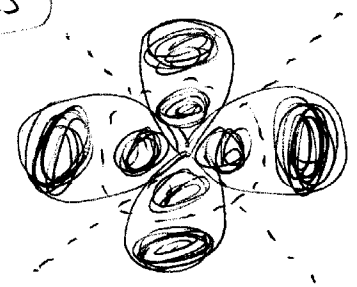
b. false - in any sample, molecules are traveling at a wide range of speeds. For He, the average speed will be higher, but there will always be some very slow and some very fast molecules in both samples.

2. 2d doesn't exist: $n=2$ and $l=2$ but l can't be equal to or greater than n.
7s and 5d are ok.
2f doesn't exist: $n=2$, $l=3$ - same reason as above

3. 4s $n-l-1 = 4-0-1 = 3$ radial nodes



4d
$n-l-1 =$
$4-2-1 = 1$ radial node
$l=2$ nodal planes



4(a) Al is more active than H, so this rxn will happen.
$2Al_{(s)} + 3H_2SO_{4\,(aq)} \rightarrow Al_2(SO_4)_{3\,(aq)} + 3H_{2\,(g)}$

(b) Tin is more active than lead, so no rxn for
$Pb_{(s)} + Sn(NO_3)_{2\,(aq)} \rightarrow NR$

(c) This rxn will happen since Sn is more active than Pb.
$Sn_{(s)} + Pb(NO_3)_{2\,(aq)} \rightarrow Pb_{(s)} + Sn(NO_3)_{2\,(aq)}$

5. a. not allowed. If $l=0$, m_l can only $=0$
$m_l = 0, \pm1, \pm2, \ldots \pm l$

b. allowed. This would be a 3d orbital.
$l < n$,
m_l is in the correct range $(-2,-1,0,1,2)$
m_s is fine