5.3 EXERCISE 3 - spontaneous reactions

1. Use the data below to determine whether the following reactions will occur under standard conditions:

Half-equation	E^o/V
$Pb^{2+}(aq) + 2e \rightarrow Pb(s)$	-0.14
$2H^+(aq) + 2e \rightarrow H_2(g)$	0.00
$Cu^{2+}(aq) + e \rightarrow Cu^+(aq)$	+0.15
$Cu^{2+}(aq) + 2e \rightarrow Cu(s)$	+0.34
$Cu^+(aq) + e \rightarrow Cu(s)$	+0.52
$I_2(aq) + 2e \rightarrow 2I^-(aq)$	+0.54
$2H^+(aq) + O_2(g) + 2e \rightarrow H_2O_2(aq)$	+0.68
$Fe^{3+}(aq) + e \rightarrow Fe^{2+}(aq)$	+0.77
$Ag^+(aq) + e \rightarrow Ag(s)$	+0.80
$NO_3^-(aq) + 2H^+(aq) + e \rightarrow NO_2(g) + H_2O(l)$	+0.81
$Br_2(aq) + 2e \rightarrow 2Br^-(aq)$	+1.09
$Cr_2O_7^{2-}(aq) + 14H^+(aq) + 6e \rightarrow 2Cr^{3+}(aq) + 7H_2O(l)$	+1.33
$H_2O_2(aq) + 2H^+(aq) + 2e \rightarrow 2H_2O(l)$	+1.77
$Ag^{2+}(aq) + e \rightarrow Ag^+(aq)$	+1.98

a) $Ag^+(aq) + Fe^{2+}(aq) \rightarrow Ag(s) + Fe^{3+}(aq)$
b) $Cr_2O_7^{2-}(aq) + 14H^+(aq) + 6I^-(aq) \rightarrow 2Cr^{3+}(aq) + 7H_2O(l) + 3I_2(aq)$
c) $Cu(s) + Pb^{2+}(aq) \rightarrow Cu^{2+}(aq) + Pb(s)$
d) $2Fe^{3+}(aq) + 2Br^-(aq) \rightarrow 2Fe^{2+}(aq) + Br_2(aq)$
e) $2Cu^+(aq) \rightarrow Cu^{2+}(aq) + Cu(s)$

2. Use the data above to predict whether the following substances will react together under standard conditions, and give the equation if a reaction is expected:

a) Pb with hydrochloric acid
b) Cu with hydrochloric acid
c) Cu with nitric acid
d) $CrCl_3(aq)$ with $CuSO_4(aq)$
e) $Fe_2(SO_4)_3(aq)$ with KI(aq)
f) $AgNO_3(aq)$ with itself
g) $H_2O_2(aq)$ with itself