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# Grade: 8th
# Division: Junior-5 (Python)
# Contest3 Year: 2019-2020
# Team: Herndon Test Prep
# Program:Junior Division: Veitch

for x in (open("data.txt", "r")):
    binary_form=bin(int(x,16))[2:]
    final=""
    if len(binary_form)<8:
        binary_form=((8-len(binary_form))*"0")+str(binary_form)
    List=list(binary_form)#End Finding Binary Form
    count=0
    for index, i in enumerate(List[:3]):
        if i=="1"and List[1:4][count]=="1"and List[4:7][count]=="1"and
List[5:8][count]=="1":
            if count==0:
                final=final+"A ";List[5 + count] = "0";List[4 + count] = "0";List[1
+ count] = "0";List[index] = "0"
            if count==1:
                final=final+"C ";List[5 + count] = "0";List[4 + count] = "0";List[1
+ count] = "0";List[index] = "0"
            if count==2:
                final=final+"~A ";List[5 + count] = "0";List[4 + count] = "0";List[1
+ count] = "0";List[index] = "0"
        count=count+1

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if "".join(List[:4])=="1111":
    final=final+"B ";List = list("".join(List[:4]).replace('1', "0") +
"".join(List[4:]))
    if "".join(List[4:])=="1111":
        final=final+"~B ";List = list("".join(List[:4]) +
"".join(List[4:]).replace('1', "0"))#End of Step 1
        if List[0]=="1" and List[3]=="1" and List[4]=="1" and List[7]=="1":
            final=final+"~C "
            List[7] = "0";List[4] = "0";List[3] = "0";List[0] = "0"#End of Step 2
count=0
for i in List[:3]:
    if List[count] == "1" and List[1:4][count]=="1":
        if count==0:
            final=final+"AB ";List[1+count] = "0";List[count] = "0"
        if count==1:
            final=final+"BC ";List[1+count] = "0";List[count] = "0"
        if count==2:
            final=final+"~AB ";List[1+count] = "0";List[count] = "0"
        count=count+1
count=0
for index, i in enumerate(List[4:7]):
    if i == "1" and List[5:8][count]=="1":
        if count==0:
            final=final+"A~B ";List[5+count] = "0";List[index + 4] = "0"
        if count==1:
            final=final+ "~BC ";List[5 + count] = "0";List[index + 4] = "0"

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    if count==2:
        final=final+"~A~B ";List[5 + count] = "0";List[index + 4] = "0"
    count=count+1#End of Step 3
if List[0]=="1" and List[4]=="1":
    final=final+"A~C ";List[0] = "0";List[4] = "0"
if List[3]=="1" and List[7]=="1":
    final=final+"~A~C ";List[3] = "0";List[7] = "0"
if List[0]=="1" and List[3]=="1":
    final=final+"B~C ";List[3] = "0";List[0] = "0"
if List[4]=="1" and List[7]=="1":
    final=final+"~B~C ";List[7] = "0";List[4] = "0"#End of step 4
for count, i in enumerate(List):
    if i=="1":
        if count==0:
            final = final + "AB~C "
        if count == 1:
            final = final + "ABC "
        if count == 2:
            final = final + "~ABC "
        if count == 3:
            final = final + "~AB~C "
        if count == 4:
            final = final + "A~B~C "
        if count == 5:
            final = final + "A~BC "

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if count == 6:
    final = final + "~A~BC "
if count == 7:
    final = final + "~A~B~C "#End of Step 5
print(final.strip().replace(" ", " + "))
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