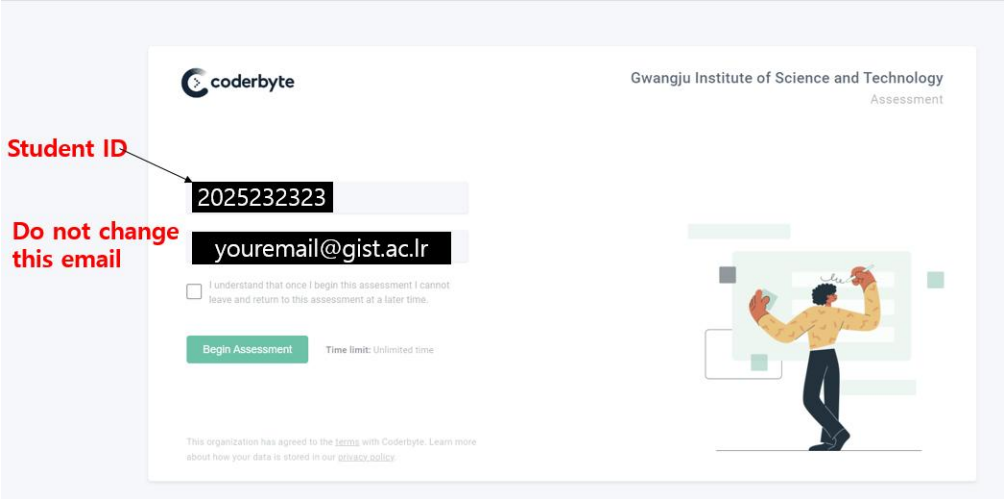
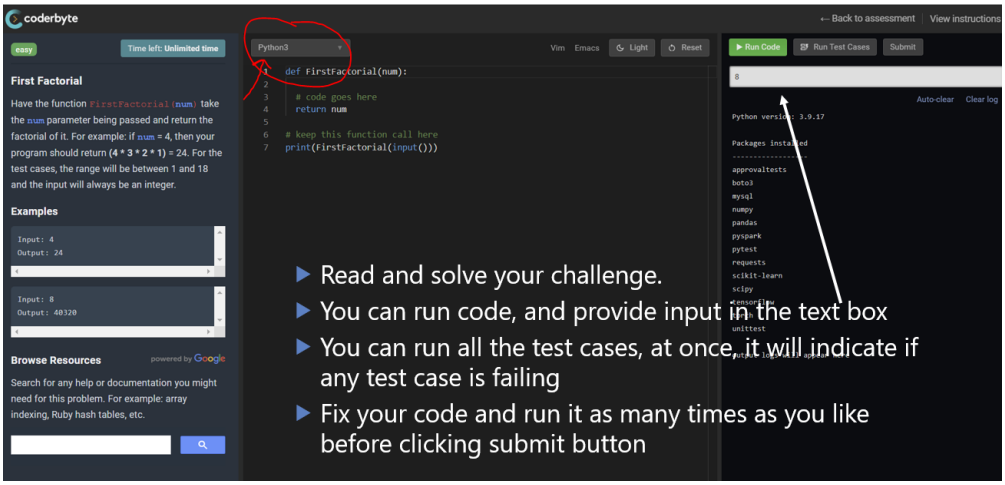
# Algo Assignment 4: DP1

## General Instruction to submit the assignment

1. Open the link sent in email and enter your **Student ID** and **ZEUS email address**




2. You must change the programming language to Python3 before starting to code. There is a drop down button above the coding window.




3. If you submit and try to resubmit etc., the system will not let you do that. (**once submitted you can not update your code**)
4. Hence **solve this question before hand and then enter your code in Coderbyte system**. This way you will save a lot of hassle. The questions will also be released in the pdf format. Make sure your code is giving right results for all the given test cases before you submit your code.
5. You may ignore warning messages about cheating when you paste your code to Coderbyte.
6. Remember total points from the assignments are only **10%** of your grades. Hence these are mainly for practicing for mid-term and final-term coding test.
7. The time complexity of your submissions will be tested only after 4$^{th}$ Assignment.

Since this assignment is about DP, try to solve these questions using DP.

## Q1. Array Addition I

Have the function `ArrayAdditionI(arr)` take the array of numbers stored in **`arr`** and return the string **true** if any combination of numbers in the array (excluding the largest number) can be added up to equal the **largest number** in the array, otherwise return the string **false**. For example: if **`arr`** contains [4, 6, 23, 10, 1, 3] the output should return **true** because 4 + 6 + 10 + 3 = 23. The array will not be empty, will not contain all the same elements, and may contain negative numbers.

Test cases:

1. For input `[1,2,3,4]`, the correct output is `true`
2. For input `[2,6,18]`, the correct output is `false`
3. For input `[10,20,30,40,100]`, the correct output is `true`
4. For input `[10,12,500,1,-5,1,0]`, the correct output is `false`
5. For input `[-2,-3,-4,-1,100]`, the correct output is `false`
6. For input `[54,49,1,0,7,4]`, the correct output is `true`
7. For input `[3,4,5,7]`, the correct output is `true`
8. For input `[1,1,1,1,6]`, the correct output is `false`
9. For input `[2,4,6,12,92]`, the correct output is `false`
10. For input `[31,2,90,50,7]`, the correct output is `true`

## Q2. Dynamic Adventure

You are on the adventure, with lots of gems but also lots of traps. Since you have telescope, you know how many gems or traps are there in every block. For example, [0, 4, -3, -6, 10, -7, 5, 0] indicate there are 8 blocks, and 1st, 2nd, 5th, 7th, and 8th block as 0, 4, 10, 5 and 0 gems respectively. 3rd, 4th, and 6th, block has traps where you lose 3, 6 and 7 gems respectively. In this adventure you are also provided with a special jumping shoe that can jump maximum of *x* blocks at once. Which means you can jump 1~*x* block in one move. Also, you must reach the exact escaping point(in the example above, the 8th block) to be rescued and end the adventure. During this process you must maximize the total gems you have collected. Good luck and have a fun adventure!

You will get two kinds of input. First number is *x*. The rest of the numbers are the information of blocks. The gem blocks are non-negative, and trap blocks are negative numbers.

You should return only one number, which is the maximum number of gems you can collect in this adventure.

Since you already have plenty of gems, losing as little can also be the best way to finish this adventure. Therefore, the answer may be negative.

For number of blocks *n*, 2 <= *n* <= 10000

For option *x*, 1 <= *x* <= 100

For each block status *b*, -10000 <= *b* <= 10000.

You start at the 1st block, so you can't avoid the trap in the 1st block.

Test cases:

1. For input `[2,2,4,-3,-6,10,-7,5,0]`, the correct output is `18`

2. For input `[3,0,4,-3,10,5,0,0,4,-3,10,5,0,0,4,-3,10,5,0,3]`, the correct output is `60`

3. For input `[7,-30,-21,84,-61,-16,-64,-76,146,13,-20,90,94,74,-103,79,83,-1,146,125,19,24,-128,-56,104,-4,7,109,-66,-134,124,-53,84,-38,68,59,-105,89,43,-39,-44,108,-77,18,-4,-32,1,-96,-141,-51,-107,-64,62,117,102,133,-88,-105,-58,21,72,-67,-104,140,-115,-116,84,115,131,65,-47,-96,145,141,100,-3,133,80,-150,-138,-9,-125,-2,7,103,-132,-127,141,-91,-113,138,100,32,147,-99,116,-81,-42,-60,62,76]`, the correct output is `4324`

4. For input `[5,-139,-3,142,-67,7,-36,118,140,42,73,-46,77,34,148,-7,-76,-22,-94,132,35,-2,-43,53,-57,105,65,109,94,-140,-16,-51,-16,-27,-103,-28,31,79,63,-95,-88,104,-90,131,-138,-55,104,58,-40,75,-89,48,-105,-32,-34,124,-138,-22,-62,88,-82,117,73,59,-30,130,-55,-11,125,102,-61,-46,104,26,-105,-29,-120,27,-71,54,23,-37,-40,18,-93,-133,-6,113,-126,-51,0,68,49,-127,145,-86,-37,-116,-50,149,-75]`, the correct output is `3431`

5. For input `[3,1333,-3956,651,-3162,-7346,9153,-2366,886,7154,-7268,-2364,-7080,-942,7042,6056,4779,-7982,2059,5871,-1559,6193,-2238,4411,6759,-9889,6915,-4426,-2030,-3692,-7422,-7286,5514,7076,-9866,2808,-6827,5823,1023,1276,-1958,-56,8688,9998,-7834,-4126,334,-3796,-2708,9616,5624]`, the correct output is `120986`

6. For input `[4,-1405,-8571,9916,7531,-9584,739,-7514,-354,-6073,5820,9592,3856,-7736,2083,-7093,-6458,5170,-2132,9118,-4942,3950,-3417,-8507,-2192,4629,-5159,5332,2484,-7086,-9072,-485,-1413,-539,2677,-7666,5167,9345,-4009,-8599,-6290,-4636,-2739,9836,3644,831,-1541,8922,6449,4233,-4966]`, the correct output is `109832`

7. For input `[5,-206,-4378,8258,-7110,4909,-5209,7437,7147,-3948,-8197,7719,-5269,-6903,-28,-9870,-2466,1018,2307,-2454,-5320,-3218,6206,1921,-7521,2569,6866,8958,-1720,-5384,3121,-8674,7560,-7404,3630,-9601,-8814,3914,5476,-2421,1559,-2672,-9437,9865,-5650,-4277,4247,-1065,-6224,3820,-3187]`, the correct output is `105086`

8. For input `[4,5162,2275,-4634,-687,-7833,-6855,-4476,4003,-6587,5630,-7314,5546,-9602,7210,-7761,3095,-1593,-4430,-6500,3902,-3141,-9810,2589,-1164,2555,-18,-1966,-2023,-7186,2056,-2793,6261,836,2424,-7607,5271,9899,4020,-6474,-8081,8776,9133,-4784,-6229,-5430,137,-1344,-4017,-6561,7135,5742,5314,6577,7919,-481,9794,-9547,3696,2609,9915,-2729,-5994,-3613,1954,7332,-2118,8248,-6360,-6806,-2743,-7509,3226,6319,4514,8151,-5428,-6398,-5153,6364,9326,-7278,-243,-9468,-3711,3194,-7695,7460,-1736,-7391,2142,-1137,-1295,8224,5722,7007,6902,4183,9679,3154,5408,-3476,-8578,9971,-7182,-9421,9156,-6012,-6188,-4464,-4612,5730,4038,-813,-3877,2487,392,5095,-77,1547,-3981,4627,-8799,3039,4435,9231,-7637,-8735,2607,-6319,8758,-303,1890,-639,8391,-9921,125,-5950,-2401,5007,-7484,9367,2893,-4189,-7397,-1437,5003,-8559,2715,7614,2462,-2041,5851,-9445,3845,-4503,-7230,-9152,-`

`5506,9756,6554,-2243,7427,-1662,891,1242,3367,5787,7344,-3497,398,4234,859,-1007,-4517,4663,5600,7474,3501,-6119,-2360,8075,262,3763,-3995,-3582,2218,-6820,-8904,2979,-6620,-6614,3570,8739,8666,1723,-1600,-5210,1169,-2794,6648,5270,-7193,8604,-4362,8630,-3259,-107,-9099,-9841,480,-5908,-9394,-4292,-6406,7679,-9564,4038,5543,2432,9535,-7317,-6508,-7742,-4673,-1498,-4053,1386,5469,-7473,9785,1916,-5836,-3066,-2782,-5778,1864,8543,-3654,4900,2910,4451,3740,-2226,2437,-7384,6836,-7284,-8366,4717,751,5424,2399,-1752,9348,6740,7659,-327,1078,5769,5539,9836,6278,-2117,9007,-7152,6272,-6015,-2766,-2063,8496,-7903,8150,-1080,9439,9285,-8876,2672,-7912,-70,6740,273,-9127,-8554,4625,-9011,-9021,1240,-4333,-2258,-4254,8771,-9980,-2707,8652,1546,-1672,-8600,-3323,5527,7848,-9896,6411,-8420,-7023,8922,-8612,3460,8237,-16,-9066,-7334,1432,5330,-4944,-1225,1139,1195,6918,-7016,-2425,765,4452,4355,7681,2818,5611,8969,5750,9384,-5786,-9599,-3127,-176,-9217,3758,-5887,8426,248,6169,45,-4269,293,-5512,5604,3773,6742,-1976,-5816,8303,-4174,-12,-5703,-9864,-1175,3024,-1756,3985,-127,4160,-8390,-7960,-7836,-6770,7700,-4989,4977,4898,-9813,3831,3022,-4782,-4732,2801,-2634,-4363,9210,-3835,-6326,4431,-4774,1092,-9398,3745,-6911,4387,6962,5407,1754,-4216,-6999,-8805,6401,436,-1684,8622,-8442,4422,1758,3434,3167,-8509,-2875,-7158,8974,-54,6687,862,175,8227,-4733,-9671,-3366,-4267,-7836,6377,1284,1654,-8004,-2124,-3619,-678,263,7626,7045,-6011,-9123,-1887,-5200,8051,-5739,1208,4534,-111,9820,9705,-6588,-6362,3827,-5627,-5852,7969,6745,2921,-8300,-9562,1800,-9153,-4449,-4361,-9956,-5214,4829,4744,609,-8711,-7271,-528,-7246,-2650,1795,-5196,2737,-7559,-4596,4627,-94,8118,-281,9552,6019,-3245,-5655,7167,-7228,-8941,1822,2110,1189,-8952,7981,-241,-9519,-578,-1066,-3714,4043,-3488,-5293,6309,-952,-7987,3575,473,-8691,4670,-6304,-1098,-9491,-665,-6285]`, the correct output is `1159825`

9. For input `[2,7692,-1090,734,-4008,-3977,8430,-9321,-7147,-8941,4345,-1417,-6615,-6981,2413,-4355,-5607,3791,-8468,-7710,7658,9561,7688,-614,-8273,-1712,6612,9029,-8209,8822,-3027,4562,5815,1035,-6971,2062,8438,3733,8957,-7576,13,-3815,-1515,-7618,5200,-5129,-92,-7147,-6018,2420,9234,3865,-8331,-7743,-2954,-3921,-8859,-4417,8293,-1839,-6797,2632,-2378,-3724,-2169,-7364,4466,1200,-2895,9029,5449,-5077,-7530,8776,-2186,-2731,5570,2757,2346,-4440,-3559,-5460,-7439,-5319,8754,-8675,7808,1605,9521,-3241,6331,-8218,-387,-5344,5696,3454,4547,6972,-5937,1122,2259,1176,-1919,-2335,-3590,-`

3853,4337,-2880,2870,2261,3974,-552,7388,-9005,-7737,-8483,6091,3138,-6411,-7165,-1129,-1659,-1534,-9712,9679,-3355,-8679,-1392,-8608,-4182,7383,-6410,1272,3412,1400,3168,2275,-1470,-8764,-6658,-2245,6442,-1558,7772,2025,1252,-6435,8906,-5443,-5214,5478,-5427,-8786,7902,2327,-280,2625,-4130,-9908,8740,-3414,-1713,-4353,-2502,-3793,5937,5047,-8943,-2646,-6247,8458,-9175,8523,464,9267,-9469,-3379,4623,8361,3388,-2112,-5793,2606,6083,5735,-5987,-3386,2498,5838,3424,9756,1059,-2473,6725,-2602,9430,7209,2617,8619,9688,4663,1907,-9488,6635,5589,-4099,-5100,-6341,3269,9728,-9829,8473,-5122,-9164,-6983,-2028,-3922,9210,8902,-5820,6197,-1184,6135,8915,-6672,-6073,-5274,-5853,866,-4584,765,-8246,1753,-6330,-1783,-6040,-749,-8231,-4833,-5109,-5774,8029,8581,-2716,-4126,-9484,-6566,994,-1098,-8621,3095,-6662,-2257,712,7637,-3611,-3266,9092,844,-3946,8350,-2239,-1749,3143,2042,-1193,986,2925,206,4288,9114,-9922,-7661,4845,-7088,6360,1081,1374,-2250,-1320,2589,-7245,-5109,-8851,-1626,3193,8112,3185,-1766,374,-6437,-1553,-5827,-641,-7586,7229,7772,141,-6021,-3942,8651,-5275,-6973,4624,8689,-9068,5750,353,1350,1433,-7347,-9508,2254,9568,7296,-6850,8993,1419,-404,9762,892,-4656,9985,-7176,-5426,-274,7162,-3402,5262,2121,-7822,2408,-5895,-2314,6632,-9818,614,-2162,8750,-3191,9404,-9113,1444,6966,2013,-468,4889,2838,5903,3738,8973,2680,9233,125,7592,-4320,5134,-9998,8146,9470,-8700,-4832,4355,5446,-8363,-8400,8550,-5793,-4663,9293,-886,4665,1160,-6799,-6377,-2483,-9945,1079,-2663,1085,-2348,9953,-7849,-3206,4954,117,-9222,4756,-6630,4202,6855,-2356,-2390,-7989,-3266,4990,-6688,-650,7598,-660,-8625,2219,-4267,-2068,-7789,9575,-4361,-4473,40,-8430,4251,-1872,4411,2236,-9599,-955,3126,-4558,8741,2465,4113,-9925,676,3864,2506,6666,824,-8802,-3795,3159,3984,829,-5068,-2540,2545,7588,3498,5046,199,-2233,7455,9702,3076,375,-959,1328,-8721,6760,9962,901,2234,-6407,-812,-9398,-2480,-106,-1858,-6746,3393,-292,-7638,6737,8846,-8226,3188,-1166,-1446,735,-8325,-9512,-6543,-2455,-9307,-9451,-9528,4065,-9750,-8941,-6316,-8852,-1153,2907,1838,6072,-9377,-8501,4114,8121,-4552,9556,3202,-5633,2731,-3533,1582,2416,-6320,-7936,-1476,3985,3478], the correct output is 808051

10. For input [6,3008,5798,-786,-5353,-4982,9883,2913,-1480,-2479,-4448,-828,-9289,9438,-1203,7628,-8820,1408,-9951,-791,9932,3933,-8705,5256,-3338,-241,9413,2539,-4137,-7195,-6714,-2320,-4213,9060,-7605,-6352,8157,2904,2533,-5299,229,6710,5856,-741,-3931,8591,-6780,3822,-

9067,7456,1951,-1525,-5380,1061,-9200,5674,6088,-1793,-8888,4139,-4087,-6152,8018,-8673,-648,-8962,-3206,-7031,-5875,-5104,5524,-9575,4925,3857,-2925,-9320,540,-2709,59,6953,5777,-5465,-2166,9813,-6166,7732,-543,-105,-8229,-6532,-3741,-5727,-8524,-5093,8072,-2316,8895,-3701,8516,953,1139,7068,-8886,7597,3041,-90,7722,-1993,7665,-79,5534,6330,8702,-4237,-9817,-2696,230,8721,5406,9720,-4248,4201,-2275,2750,9002,8197,8387,-3853,-6455,-9017,4032,-9264,5644,5835,1310,-4486,2429,-1921,-4491,3674,6854,8378,5259,-4088,8145,7966,7262,-949,-2688,4424,-9132,1000,-6525,-2260,-3490,-6368,-3839,3133,914,1667,7481,-7283,2294,-8997,8236,-5598,-6923,-7823,8897,4750,-2648,-9041,213,-1395,-8034,7667,3884,856,-7892,8218,-9305,7695,-2690,-7790,2602,-155,-2950,3143,9252,-5969,2713,1951,-3426,9629,-2719,6200,9456,-9799,4228,-8802,-9388,-8042,-2081,-308,3222,6275,-2201,675,7666,-3711,-789,-8819,-4878,5002,-1356,2807,-2937,-3844,-1897,-2712,-1171,-8356,-7161,-6335,-1187,-9125,-206,-5300,8019,327,1967,-4074,7193,-9610,-3473,4846,-3856,-813,-6833,-4453,-5003,-1467,-4581,4158,7327,4414,-9730,2035,-4175,-7787,-3132,-3125,-6955,-6245,3938,-7194,4452,8595,-7761,-6802,-5589,-1712,4103,8707,-2060,-2347,-5282,4925,-2760,-6887,886,5511,4002,7447,514,3387,-7936,-5935,-87,-4150,6776,7950,6857,4560,2071,-4420,2375,-8428,-3669,1859,54,-3306,1051,8960,-9440,8026,-2022,-4273,-5133,3644,-428,-8016,-1626,9276,-7605,-8681,1816,3693,7863,3779,-6823,-144,-8256,7320,3857,5786,-883,-7442,6670,4840,5632,4,4234,-8645,-1786,-3973,-7638,2767,-6718,8003,-9498,-2778,-6711,-2202,-6454,-3103,1072,6290,3053,-5915,3892,-5622,-2548,9510,5857,-8522,-4373,-8660,2328,354,3237,-699,4015,5624,4249,4419,-1406,8002,-8167,-4806,-4511,4021,-6818,4108,1452,-6040,2077,-1129,-3645,-5018,-7430,-8918,6087,9862,6731,-5225,-49,-462,-3760,-6660,-609,-4532,3903,2469,9477,575,486,-7105,6231,-3839,1648,-2598,4179,5351,6594,-4094,4898,3422,7216,7804,9464,-2046,-6102,-3698,-9952,8009,8440,7393,-4591,-9806,706,-6674,-9019,-6468,3606,-8585,896,2476,-2624,-7211,7044,-8784,7669,-2069,-9267,-9719,1461,3630,5903,-81,7055,-6485,-7894,3283,2976,8565,2377,6593,4744,-9536,7661,1992,-2429,5134,5957,-90,3430,6846,-5367,-2719,-7401,5080,-6144,7153,6466,-5822,2467,7553,9259,4471,-8272,2761,-6027,7876,8871,-5642,4840,1106,6017,5434,-7327,-817,1309,3226,-8303,4022,-4270,-676,-4997,8558,3046,-4362,-8233,-8397,9234,-4707,-9330,4595,-6853,5790,-6071,3029,1863,5253,-4496,5238,-928,8051,-8571,-914,4853], the correct output is `1205109`

If there are any issues with submitting assignment, please contact me.

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