Write Assembly programs for the following algorithms. Assume that X, Y, Z are stored from 20, 21 and 22 memory locations.

**Question 01**

**If**

**X== 0**

**F**

Z = X2 – Y2

**T**

Z = X

|  |  |
| --- | --- |
| **20** | **X** |
| **21** | **Y** |
| **22** | **X2 -Y2** |
| **23** |  |

|  |  |  |
| --- | --- | --- |
| **Memory Address** | **Assembly Ins** | **Acc** |
| **40** | **LDA (20)** | **X** |
| **41** | **JM0 (50)** | **Acc == X == 0** |
| **42** | **LDA (21)** | **Y** |
| **43** | **MUL (21)** | **Y2** |
| **44** | **STA (22)** | **Y2** |
| **45** | **LDA (20)** | **X** |
| **46** | **MUL (20)** | **X2** |
| **47** | **SUB (22)** | **X2 -Y2** |
| **48** | **STA (22)** | **X2 -Y2** |
| **49** | **JMP (52)** | **---** |
| **50** | **LDA (20)** | **X** |
| **51** | **STA (22)** | **X** |
| **52** | **HLT --** | **--** |

**Question 02**

**If**

**X == Y**

**F**

Z = 2X2 + Y

**T**

Z = 0

|  |  |  |
| --- | --- | --- |
| **Memory Address** | **Assembly Ins** | **Acc** |
| **40** | **LDA (20)** | **X** |
| **41** | **SUB (21)** | **X - Y** |
| **42** | **JM0 (49)** | **X – Y == 0** |
| **43** | **LDA (20)** | **X** |
| **44** | **ADA (20)** | **2X** |
| **45** | **MUL (20)** | **2X2** |
| **46** | **ADA (21)** | **2X2 + Y** |
| **47** | **STA (22)** | **2X2 + Y** |
| **48** | **JMP (50)** | **--** |
| **49** | **STA (22)** | **0** |
| **50** | **HLT --** | **--** |
| **51** |  |  |
| **52** |  |  |

|  |  |  |
| --- | --- | --- |
| **Memory Address** | **Assembly Ins** | **Acc** |
| **40** | **LDA (20)** | **X** |
| **41** | **SUB (21)** | **X - Y** |
| **42** | **JM0 (47)** | **X – Y == 0** |
| **43** | **LDA (20)** | **X** |
| **44** | **ADA (20)** | **2X** |
| **45** | **MUL (20)** | **2X2** |
| **46** | **ADA (21)** | **2X2 + Y** |
| **47** | **STA (22)** | **2X2 + Y** |
| **48** | **HLT --** | **--** |
| **49** |  |  |
| **50** |  |  |
| **51** |  |  |
| **52** |  |  |

**Question 03**

**2X2 < Y3**

**F**

Z = X– 2Y

**T**

Z = 2X + Y

|  |  |  |
| --- | --- | --- |
| **Memory Address** | **Assembly Ins** | **Acc** |
| **40** | **LDA (21)** | **Y** |
| **41** | **MUL (21)** | **Y2** |
| **42** | **MUL (21)** | **Y3** |
| **43** | **STA (22)** | **Y3** |
| **44** | **LDA (20)** | **X** |
| **45** | **ADA (20)** | **2X** |
| **46** | **MUL (20)** | **2X2** |
| **47** | **SUB (22)** | **2X2 – Y3** |
| **48** | **JMN (54)** | **2X2 – Y3 < 0** |
| **49** | **LDA (20)** | **X** |
| **50** | **SUB (21)** | **X - Y** |
| **51** | **SUB (21)** | **X – 2Y** |
| **52** | **STA (22)** | **X – 2Y** |
| **53** | **JMP (58)** | **--** |
| **54** | **LDA (20)** | **X** |
| **55** | **ADA (20)** | **2X** |
| **56** | **ADA (21)** | **2X + Y** |
| **57** | **STA (22)** | **2X + Y** |
| **58** | **HLT ---** | **--** |

**Question 04**

**X3 - 2Y > Y3**

**F**

Z = **Y3**

**T**

Z = 2X2 / 2Y

|  |  |  |
| --- | --- | --- |
| **Memory Address** | **Assembly Ins** | **Acc** |
| **40** |  |  |
| **41** |  |  |
| **42** |  |  |
| **43** |  |  |
| **44** |  |  |
| **45** |  |  |
| **46** |  |  |
| **47** |  |  |
| **48** |  |  |
| **49** |  |  |
| **50** |  |  |
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| **57** |  |  |
| **58** |  |  |
| **59** |  |  |
| **60** |  |  |
| **61** |  |  |
| **62** |  |  |
| **63** |  |  |