CS 1511 Homework 19

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35. a) The polynomial to replace z would be $\sum_{x=0}^{1}\prod_{y=0}^{1}\sum_{z=0}^{1} 1-(1-(xy(1-z)))*(1-((1-x)(1-y)z))$ After multiplication, this becomes $\sum_{x=0}^{1}\prod_{y=0}^{1}\sum_{z=0}^{1} 1-(1-(xy-xyz))*(1-(z(1-y-x+xy)$
$1-(1-(xy-xyz))*(1-(z-zy-zx+zxy))$
$1-((1-(z-zy-zx+zxy))-(xy+xyz)+(xyz-xy^2z-x^2zy+zx^2y^2-xyz^2+xy^2z^2+x^2yz^2-x^2y^2z^2)$
$1-(1-z+zy+zx-zxy-xy-xyz+xyz-xy^2z-x^2zy+zx^2y^2-xyz^2+xy^2z^2+x^2yz^2-x^2y^2z^2$

Which all finally becomes
$\sum_{x=0}^{1}\prod_{y=0}^{1}\sum_{z=0}^{1} 1-(1-z-yz+xz-xyz-xy-xy^2z-x^2zy+zx^2y^2-xyz^2+xy^2z^2+x^2yz^2-x^2y^2z^2)$

35. b) i. The integer S would start with the polynomial $s(x)=\prod_{y=0}^{1}\sum_{z=0}^{1} 1-(1-z-yz+xz-xyz-xy-xy^2z-x^2zy+zx^2y^2-xyz^2+xy^2z^2+x^2yz^2-x^2y^2z^2)$ added together having 0 and 1 for x to get S. Here would be those steps.

WORK NEEDED HERE
1. With x = 0, y = 0, z = 0

ii. The polynomial is g(y) = $\sum_{z=0}^{1} 1-(1-z-yz+(1/3)z-(1/3)yz-(1/3)y-(1/3)y^2z-(1/3)^2zy+z(1/3)^2y^2-(1/3)yz^2+(1/3)y^2z^2+(1/3)^2yz^2-(1/3)^2y^2z^2)$

iii. Arthur is checking if this second polynomial works such that g(0) * g(1) = s(1/3) to see if there is any issue with s(1/3). If there is, then there is proof that s(1/3) is inccorect.

35. c) i. The polynomial to replace z would now be
$\sum_{x=0}^{1}\prod_{y=0}^{1}\sum_{z=0}^{1} 1-(1-z-yz+xz-xyz-xy-xyz-xzy+zxy-xyz+xyz+xyz-xyz)$

ii. The integer S would be generated the same way as above, with the polynomial $s(x)=\prod_{y=0}^{1}\sum_{z=0}^{1} 1-(1-z-yz+xz-xyz-xy-xyz-xzy+zxy-xyz+xyz+xyz-xyz)$

WORK NEEDED HERE
1. With x = 0, y = 0, z = 1

Here are the steps to find S:

iii. The polynomial is g(y) = $\sum_{z=0}^{1} 1-(1-z-yz+(1/3)z-(1/3)yz-(1/3)y-(1/3)yz-(1/3)zy+z(1/3)y-(1/3)yz+(1/3)yz+(1/3)yz-(1/3)yz)$

iv. Arthur is checking if this second polynomial works such that g(0) * g(1) = s(1/3) to see if there is any issue with s(1/3). If there is, then there is proof that s(1/3) is inccorect.