Mid - term

1. $\Pi_{\text{countu}(\text{student\_name})} (G_{\text{countu}(\text{student\_name})} (\sigma_{\substack{\text{college\_name}='UCI' \\ \wedge \text{ year} \geq 2010 \\ \wedge \text{ year} \leq 2020 \\ \wedge \text{ degree}='PhD'}} (\text{graduate})))$

2. *

$\Pi_{\text{countu}(\text{student\_name})} (G_{\text{countu}(\text{student\_name})} (\sigma_{\substack{(\text{region}='mid-west' \\ \vee \text{ region}='west')}}(\text{region}) \bowtie \sigma_{\substack{\text{degree}='PhD' \\ \wedge \text{ year} \geq 2010. \\ \wedge \text{ year} \leq 2020}}(\text{graduate}) \bowtie \text{College}))$

3.

Assume $\text{College\_name} G_{\text{countu}(\text{student\_name})} (\sigma_{\substack{\text{major}='\text{Computer Science}' \\ \wedge \text{ degree}='PhD' \\ \wedge \text{ year}=2019}}(\text{graduate}))$ as $g1$

Assume $G_{\text{max}(\text{countu}(\text{student\_name})}(g1)$ as $g2$

∴ Answer: $\Pi_{\text{college\_name}} (\sigma_{\text{countu}(\text{student\_name})=\text{max}(\text{countu}(\text{student\_name})}(g1 \times g2))$

4.

Assume $\text{college\_name} \, G_{\text{count}_u(\text{degree})} \left(\sigma_{\text{degree} \neq '\text{PhD}'}^{(\text{graduate})} \right)$ as $g1$

$$\Pi_{\text{college\_name}}(\text{College}) - \Pi_{\text{College\_name}}\left(\sigma_{\text{degree} = '\text{PhD}'}^{(\text{graduate})}\right) - \Pi_{\text{college\_name}}\left(\sigma_{\text{count}_u(\text{degree}) = 1}^{(g1)}\right)$$

5.

$$\Pi_{\text{Student\_name}}\left(\sigma_{\substack{g1.\text{student\_name} = g2.\text{student\_name}}} \left[\rho_{g1}^{(\text{graduate})} \times \rho_{g2}^{(\text{graduate})} \times \rho_{g3}^{(\text{graduate})} \right] \right)$$

$\wedge \, g2.\text{student\_name} = g3.\text{student\_name}$

$\wedge \, g1.\text{degree} \neq g2.\text{degree} \wedge g1.\text{degree} \neq g3.\text{degree}$

$\wedge \, g2.\text{degree} \neq g3.\text{degree}$

$\wedge \, g1.\text{college\_name} = g2.\text{college\_name}$

$\wedge \, g2.\text{college\_name} = g3.\text{college\_name}.$

6.

Assume $\text{college} \, G_{\text{count}_u(\text{student\_name})} \left(\sigma_{\text{year} = 2018 \, \wedge \, \text{degree} = '\text{phD}'}^{(\text{graduate})} \right)$ as $g1$

Assume $\text{College} \, G_{\text{count}_u(\text{student\_name})} \left(\sigma_{\text{year} = 2019 \, \wedge \, \text{degree} = '\text{PhD}'}^{(\text{graduate})} \right)$ as $g2$

Assume $\text{college} \, G_{\text{count}_u(\text{student\_name})} \left(\sigma_{\text{year} = 2020 \, \wedge \, \text{degree} = '\text{PhD}'}^{(\text{graduate})} \right)$ as $g3$

$\therefore$ Answer : $\Pi_{\text{college\_name}}\left(\sigma_{}(g1 \times g2 \times g3) \right)$

$g1.\text{college\_name} = g2.\text{college\_name}$

$\wedge \, g2.\text{college\_name} = g3.\text{college\_name}$

$\wedge \, g1.\text{count}_u(\text{student\_name}) < g2.\text{count}_u(\text{student\_name})$

$\wedge \, g2.\text{count}_u(\text{student\_name}) < g3.\text{count}_u(\text{student\_name})$

7.

Assume $(\text{Graduate} \bowtie \text{College})$ as $a1$

$\Pi_{\text{student\_name}}\left(\sigma\left(\rho_{C_1}^{(a1)} \times \rho_{C_2}^{(a1)} \times \rho_{C_3}^{(a1)}\right)\right)$

$C_1.\text{student\_name} = C_2.\text{student\_name}$

$\wedge C_2.\text{student\_name} = C_3.\text{student\_name}.$

$\wedge C_1.\text{State} \neq C_2.\text{State} \wedge C_1.\text{State} \neq C_3.\text{State}$

$\wedge C_2.\text{State} \neq C_3.\text{State} \wedge C_1.\text{degree} \neq C_2.\text{degree}$

$\wedge C_2.\text{degree} \neq C_3.\text{degree} \wedge C_1.\text{degree} \neq C_3.\text{degree}$

8.

$\Pi_{\text{student\_name}}\left(\sigma\left(\rho_{g_1}(\text{graduate}) \times \rho_{g_2}(\text{graduate})\right)\right)$

$g_1.\text{degree} = \text{'Master'} \wedge g_2.\text{degree} = \text{'Master'}$

$\wedge g_1.\text{student\_name} = g_2.\text{student\_name}$

$\wedge (g_1.\text{college\_name} \neq g_2.\text{college\_name}$

$\vee g_1.\text{year} \neq g_2.\text{year} \vee g_1.\text{major} \neq g_2.\text{major})$

9. Assume

$_{\text{major}}G_{\text{countu (student\_name)}}\left(\sigma_{\substack{\text{year} \leq 2020 \,\wedge\, \text{year} \geq 2010 \\ \wedge\, \text{degree} = \text{'PhD'}}}(\text{graduate})\right)$ as g_1

Assume

$G_{\text{max(countu (student\_name)}}^{(g_1)}$ as g_2

$\therefore$ Answer : $\Pi_{\text{major}}\left(\sigma_{g_1.\text{countu(student\_name)} = g_2.\text{max(countu(student\_name))}}(g_1 \times g_2)\right)$

10.

Assume $\text{college } G_{\text{countu(major)}}\,\sigma^{(\text{graduate})}_{\text{degree}='\text{PhD}'}$ as $g1$

Assume $\text{college } G^{(\text{graduate})}_{\text{countu(major)}}$ as $g2$

$\therefore$ Answer: $\Pi_{\text{college}}\left(\sigma^{(g1 \times g2)}_{\substack{g1.\text{countu(major)} = g2.\text{countu(major)} \\ \wedge g1.\text{college\_name} = g2.\text{college\_name}}} \right)$