

$$T(x, y, z) = xy^2 + 2z - x^2z^2$$

$$\nabla T = (y^2 - 2xz^2)\hat{i} + \hat{j}(2xy) + \hat{k}(2 - 2zx^2)$$

$$(\nabla T)(1, 0, -1) = \hat{i}(0 - 2) + \hat{j}(0) + \hat{k}(2 + 2)$$

$$= -2\hat{i} + 4\hat{k}$$

$$\text{Unit vector} = \frac{\nabla T}{|\nabla T|} = \frac{-2\hat{i} + 4\hat{k}}{\sqrt{20}}$$

$$= \frac{-2\hat{i}}{2\sqrt{5}} + \frac{4\hat{k}}{2\sqrt{5}} \Rightarrow \left[-\frac{\hat{i}}{\sqrt{5}} + \frac{2\hat{k}}{\sqrt{5}} \right] \checkmark$$

~~option (a)~~

for minimum

$$-\frac{\nabla T}{|\nabla T|} = \left[\frac{\hat{i}}{\sqrt{5}} - \frac{2\hat{k}}{\sqrt{5}} \right] \text{ is option (b)}$$