$$2\left(\frac{4}{3}\right) + 5\left(\frac{-4}{3}\right) = -4$$

$$\frac{8}{3} - \frac{20}{3} = \frac{-12}{3} = 4$$

$$P = \left(\frac{4}{3}, -\frac{4}{3}\right)$$

Name:

Exercise 1. Find the point on the plane $x + 2y + z = 2$ which is closest to the point $P(2,0,4)$.

plane $x + 2y + z = 2$

point $(2,0,4)$

$f(x,y) = 2x^2 + 4xy + 5y^2 + 8$

$f_x = 4x + 4y$ $\Big\} = 0$

$f_y = 10y + 4x$

$\boxed{x = -y}$

$\frac{5y}{2} = -x$

$x + y = 0$

$2x + 5y = -4$

$3y = -4$

$y = -\frac{4}{3}$

$x = \frac{4}{2}$

$D(x,y) = f_{xx} f_{yy} - (f_{xy})^2 = 4 \times 10 - (4)^2$, f_{xx}

$40 - 16 = 24 > 0$

xyz to P

$d(x) = \sqrt{(x-2)^2 + (y-0)^2 + (z-4)^2}$

$d(x, y, 2-x-2y) = \sqrt{(x-2)^2 + y^2 + (2-x-2y)^2}$

$f(x,y) = d(xy)^2$

$(x-2)^2 + y^2 + (2-x-8y-4)^2 \quad (-x-2y-2)(-x-2y-2)$

$f(x,y) = x^2 - 4x + 4 + y^2 + x^2 + 2xy + 2x + 2yx + 4y^2 + 4y + 2x + 4y + 4$

$2x^2 + 0x + 8 + 5y^2 + 8y + 4xy$

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