

14.4 Answers

① a) $z = 4x + 2$ b) $z = 2x + 2y$

② a) Note that $f_x(x, y) = \frac{y}{2\sqrt{x}}$ and

$f_y(x, y) = \sqrt{x}$. Both of these partials are continuous on their domains which include $(4, 1)$ (since root functions, rational functions, and composites of continuous functions are all continuous on their domains).

$$L(x, y) = \frac{1}{4}x + 2y - 1$$

b) The first part I leave to you.

$$L(x, y) = 3x$$

③ $L(x, y) = -\frac{7}{3}x - \frac{2}{3}y + \frac{20}{3}$

$$L(1.08, 1.96) = 2.84 \text{ or } \frac{71}{25}$$

④ $L(x, y, z) = \frac{1}{9}x + \frac{4}{9}y + \frac{8}{9}z$

$$L(0.95, 4.02, 7.99) \approx 8.9978$$

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⑤ a) $dz = 2x \ln y^3 dx + \frac{3x^2}{y} dy$

b) $(ze^{xy} + xye^{xy}) dx + x^2 z e^{xy} dy + x e^{xy} dz$

⑥ $L(w, d) = -0.0006(w - 140) + 0.0265(d - 3) + 0.08$