

Practice Problems for Exam 2 — Answers

1 (1) $dz/dt = 2xy \cdot 2t + (x^2 + 6y^2) \cdot 2(t - 1)$,

(2) $\partial z/\partial u = (3x^2 + y^2) \cdot v + 2xy + 3y^2$, $\partial z/\partial v = (3x^2 + y^2) \cdot u + 2xy + 3y^2$.

2 -7.

3 (1) $\nabla f(x, y) = (2xy)i + (x^2 + 3y^2 - 2y)j$, $D_v f(0, 1) = 4/5$, and max rate of change is 1.

(2) $\nabla g(x, y) = (1/y + y)i + (-x/y^2 + x)j$, $D_v g(0, 1) = 6/5$, and max rate of change is 2.

(3) $\nabla h(x, y) = (2xy \cos(x^2 y) + y^2)i + (x^2 \cos(x^2 y) + 2xy)j$, $D_v h(0, 1) = 3/5$, and max rate of change is 1.

4 $4(x - 2) + 4(y - 1) - 2(z - 1) = 0$.

5 $x = 3 - 10t$, $y = 4 + 4t$, $z = 5 - 2t$.

6 (1) $(0, 0)$ -minimum, $(0, 1)$ - saddle.

(2) $(1, \frac{1}{2})$ - minimum, $(-\frac{1}{3}, \frac{11}{6})$ - saddle.

7 $\min = -3$ which occurs at the point $(0, 3)$.

8 (1) $\max = 3/\sqrt{8}$, $\min = -3/\sqrt{8}$,

(2) $\max = (19/4) \times \sqrt{40/19}$, $\min = -(19/4) \times \sqrt{40/19}$.

9 (1) $46/3$, (2) $192/9$, (3) $-5/6$, (4) $(1 - \cos 1)/12$.

10 (1) -2 , (2) $e/2 - 1/2$, (3) $1/12$.

11 (1) 12, (2) $19/210$.