

Practice Exam 1

- 1a) $\langle 10/\sqrt{109}, -3/\sqrt{109} \rangle$
b) Max: $\sqrt{1744} = 4\sqrt{109}$; min: $-\sqrt{1744} = -4\sqrt{109}$
c) $-40(x-2) + 12(y+1) + (z-21) = 0$
2a) Max: none; min: $(0, 0)$; saddle: $(0, 1)$
b) Max: $f = 3$ at $(-1, 1)$ and $(1, 1)$; min: $f = 0$ at $(0, 0)$
3) Max: $f = 3$ at $(-\frac{1}{3}, \frac{4}{3}, \frac{4}{3})$; min $f = -3$ at $(\frac{1}{3}, -\frac{4}{3}, -\frac{4}{3})$
4a) 3
b) $\frac{8}{45}$
5a) $\frac{\partial z}{\partial r}|_{r=2,s=3} = 36$; $\frac{\partial z}{\partial s}|_{r=2,s=3} = -26$;
b) 13.2

Practice Exam 2

- 1) Max: none; min: $(1, \frac{1}{2})$; saddle: $(-\frac{1}{3}, \frac{11}{6})$
2) height: $\sqrt[3]{\frac{3}{2}}$; length: $\sqrt[3]{12}$; width: $\sqrt[3]{12}$
3a) $2\sqrt{2}$
b) $4(x-2) + 8(y-2) = 0$
c) $(1, 2, -1)$ and $(-1, -2, 1)$
4a) $(2x^3y - z^3)/(x^2 + 3yz^2 - 5)$
b) 0
c) $\langle 5\sqrt{10}, -15\sqrt{10} \rangle$
5a) 32
b) $\int_0^1 \int_{2x}^2 (4 - y^2) dy dx$