

MATH 353
Handout #2

1. Find absolute extrema of $f(x, y) = \frac{1}{8}x^3 + y^3$ on the circle $x^2 + y^2 = 65$
2. Find the absolute extrema of $f(x, y) = x^2 + y^2$
on the surface $S = \left\{ \frac{1}{8}x^3 + y^3 = 65, x \geq 0, y \geq 0 \right\}$.
3. Find absolute maximum and minimum of $f(x, y) = 2y^2 - x + x^2$
inside and on the triangle T with vertices $O(0, 0)$, $A(1, 1)$, $B(1, -1)$.
4. Find the point on the plane $x - 2y - z = 3$ closest to the point $P(1, -1, 2)$.
Justify!
5. Find absolute maximum of $f(x, y, z) = xyz$ for $x, y, z \geq 0$
on the surface $2xy + 2xz + 3yz = 144$.
(You may assume that there is an absolute maximum).
6. (a) Evaluate $\int_1^3 \left(\int_{-x}^{x^2} xe^{2y} dy \right) dx$.
(b) Switch the order of integration in the integral above and sketch the region D .
7. Evaluate $\iint_D \sqrt{2 - x^2} dA$ where D is smaller region between $y = x^2$ and $x^2 + y^2 = 2$.
and sketch the region
8. Switch the order of integration in the integral $\int_0^{\frac{\pi}{4}} \left(\int_0^{\tan x} f(x, y) dy \right) dx$.
9. For $\iint_D \frac{1}{x^2 + y} dA$ where D is the region between the x-axis and $y = 4 - x^2$
sketch the region D and set up BOTH iterated integrals and evaluate one of them.
(Hint: $\lim_{x \rightarrow 0^+} x \ln x = 0$).
10. Calculate the volume of the solid below the surface $z = e^{(y-1)^2}$ and above the triangle T
with vertices
 $A(-1, 0)$, $B(0, 1)$, $C(2, 0)$ with vertical sides.