Quiz #9; Tuesday, date: 03/20/2018
MATH 53 Multivariable Calculus with Stankova
Section #114; time: 2 – 3:30 pm
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1. Calculate the iterated integral.

$$\int_0^1 \int_0^1 (x+y)^3 \, dx \, dy$$

Solution. We compute the integral iteratively.

$$\begin{aligned}\int_0^1 \int_0^1 (x+y)^3 \, dx \, dy &= \int_0^1 \left[\frac{(x+y)^4}{4}\right]_{x=0}^{x=1} dy \\ &= \int_0^1 \frac{(y+1)^4 - y^4}{4} \, dy \\ &= \left[\frac{(y+1)^5 - y^5}{20}\right]_0^1 \\ &= \frac{31}{20} - \frac{1}{20} \\ &= \frac{3}{2}.\end{aligned}$$

2. *True / False?* When we are are finding the maxima and minima of a nice function with constraint $x^2 + y^2 = 1$, we will always find an absolute maximum and an absolute minimum.

   Solution. **True.** The problem can be viewed as finding the maxima and minima over a closed and bounded domain ($x^2 + y^2 = 1$), so by Theorem 14.7.8 on pg. 965 there will be an absolute maximum and an absolute minimum.

3. *True / False?* The solid under the graph of $z = 8 - x^2 - y^2$ and over the region $[-2, 2] \times [-2, 2]$ can be thought of as the solid when $z = 8 - x^2$ is revolved about the z-axis, and can thus be computed without using a double integral.

   Solution. **False.** While it is true that $z = 8 - x^2 - y^2$ can be obtained by revolving $z = 8 - x^2$ about the z-axis, the solid we consider here is not a solid of revolution. For example, a sketch of the solid will show that there are "flat" faces of this solid while the solid of revolution should have none.