MATH 20C
WINTER 2020
SECTION D00 (MANNERS)

Homework – week 5

Due by 2359 (11:59 PM) on Sunday February 9. Hand in via Gradescope.

For problem 0, credit is awarded for any honest response, not for the amount of work undertaken.

For problems 1, 2 and 3, you *must* give a fully written-out solution showing all your working and justification. Stating the correct answer, by itself, will earn no credit.

0. Do the following textbook problems. *Do not turn them in*, but provide a list here of those for which you wrote down solutions.

§2.3: 1, 3, 7, 9
§2.4: 1, 3.

(1 points)

1. Consider the function $f(x, y, z) = \frac{xyz}{x^2+y^2+z^2}$.

(a) Compute the gradient vector $\nabla f(a, b, c)$ at a general point $(a, b, c) \in \mathbb{R}^3$.

(b) Without using a calculator, compute the value of $f(2, -2, -1)$, and then estimate the value of $f(2.0002, -1.9999, -1.0003)$ to four decimal places.

(6 points)

2. Let $f(x, y) = x^2 + 2y^3$. Find the equation of the tangent plane to the graph $z = f(x, y)$ at the point $(x, y, z) = (1, 1, 3)$.

(6 points)

3. Consider the curve $\vec{c}(t) = (\sin(2t), \sin(t))$.

(a) Compute the velocity $\vec{c}'(t)$ of the curve for a general parameter t.

(b) Without using a calculator, compute the value $\vec{c}(0)$, and estimate the value of $\vec{c}(0.0001)$ to four decimal places. [For the purposes of evalutaing $\sin(t)$ and $\sin(2t)$, t is assumed to be in radians.]

(6 points)