Weekly Assignment 3 (Due Tuesday 7/13 at 11:59PM)

Overview: This assignment is graded out of **96 points**. There are **7 problems**, each of which is worth **16 points** for a total of **112 points** possible. **Therefore, a score above 96 points earns you extra credit.** Your score for each question will depend on the graders determination of your proficiency in each of the following categories: Conceptual Understanding, Strategies & Reasoning, Computation & Execution, and Communication. You can earn up to 4 points for each category. The grader determines your score for each category using the Weekly Assignment Rubric.

Guidelines: You are required to adhere to the weekly assignment guidelines and the assignment submission guidelines in the syllabus. If you fail to follow the guidelines, you risk receiving no credit for you work. Turn in your assignment via gradescope.

Directions: Complete the following exercises from the Active Calculus textbook. You can click the links below to go directly to the exercise.

1. Exercise 10.1.4.

2. Exercise 10.2.13.

3. Exercise 10.3.12.

4. Let f be a function that is continuously differentiable at $(2, 7)$ and suppose that its tangent plane at this point is given by

$$z = -1 + 4(x - 2) - 3(y - 7).$$

- **(a)** Determine the values of $f(2, 7)$, $f_x(2, 7)$, and $f_y(2, 7)$. Explain your reasoning for each part.
- **(b)** Estimate the value of $f(1.8, 7.2)$. Show your work and explain your reasoning.
- **(c)** Given the changes $dx = -0.23$ and $dy = .12$, estimage the corresponding change in f that is given by the differential df.
- **(d)** Suppose that g is another function continuously differentiable at $(2, 7)$ with tangent plane given by

$$x - y - z = 10.$$

  Determine $g(2, 7)$, $g_x(2, 7)$, and $g_y(2, 7)$ and then estimate $g(1.8, 7.2)$. Explain your reasoning.

5. Let g be the function defined by the equation $g(x, y) = 4x^3 + 2y^2$.

- **(a)** Find the equation of the tangent plane to g at the point $(1, 1)$.
- **(b)** Use the local linearization to approximate the values of g at the points $(1.1, 1.05)$ and $(1.3, 1.2)$.
- **(c)** Compare your approximations with the exact values $g(1.1, 1.05)$ and $g(1.3, 1.2)$. Which approximation is the most accurate? Why should this be expected?

6. Exercise 10.5.12.

7. Exercise 10.6.11.