Math 250B-DX02
Test 2

SUBMISSION DEADLINE: 4:30pm Pacific Time

Submit on D2L or email HowardL@camosun.ca

Number of Questions: 4
Total Marks: 20

Show all your work for full marks.
You MAY use the course website (notes, videos etc)
You may NOT copy from others (classmates, tutors, Chegg etc)

Submit jpg or pdf files
Feel free to handwrite your solutions and take photos of your work

1. [5 marks] Let $w = xy + xz + yz$ where:

$$x = s^2 - t^2, \quad y = s^2 + t^2, \quad z = \frac{\sqrt{t}}{\sqrt{s}}$$

a) Find $\frac{\partial w}{\partial t}$ using the Multivariable Chain Rule
b) Evaluate $\frac{\partial w}{\partial t}$ at $(s, t) = (1, 2)$

2. [5 marks] Ground temperature (in °C) is given by $f = 23 - 0.1x^2 + 0.2y^2$, where x and y are measured in km.

a) From $(x, y) = (3, 4)$ head towards $(x, y) = (10, 12)$. What is the initial rate of change of temperature?
b) A jogger travels at 10 km/h as described in part a). What initial rate of change of temperature does the jogger experience?
c) From $(x, y) = (3, 4)$, what is the maximum rate of increase of f?

3. [5 marks] a) The function $f = 2\ln x - 10x - \frac{1}{y} - 4y$ has one critical point that has $x > 0$ and $y > 0$. Find it.
b) Is this critical point a local maximum, a local minimum or a saddle point? Show your work.

4. [5 marks] Given $2x + 5y + 3z = 14$, minimize $f = (x-4)^2 + (y+2)^2 + (z-6)^2$ using the Lagrange Multiplier method. State the minimum value of f and the point (x, y, z) at which the minimum is achieved.