

# Quiz 6

This is a two-stage quiz. During the first stage, use your knowledge & calculator. You have 15 min. In the second stage, you are now welcome to use your books, notes, and students in the class to retake the same quiz. You have the remainder of the quiz time to write one solution (with everyones name on it!!!) to be turned in for the group.

- The wind-chill index  $W$  is the perceived temperature when the actual temperature is  $T$  and the wind speed is  $v$ , so we can write  $W = f(T, v)$ . The table below provides some values for  $W$  as a function of  $T$  and  $v$ .

|                         |                  | Wind speed (km/h) |     |     |     |     |     |
|-------------------------|------------------|-------------------|-----|-----|-----|-----|-----|
| Actual temperature (°C) | $T \backslash v$ | 20                | 30  | 40  | 50  | 60  | 70  |
|                         | -10              | -18               | -20 | -21 | -22 | -23 | -23 |
|                         | -15              | -24               | -26 | -27 | -29 | -30 | -30 |
|                         | -20              | -30               | -33 | -34 | -35 | -36 | -37 |
|                         | -25              | -37               | -39 | -41 | -42 | -43 | -44 |

- [2] Approximate  $f_T(-25, 30)$

- [4] Find a local linearization for  $f$  that could be used when  $T$  is near  $-30^\circ\text{C}$  and  $v$  is near 32 km/hr.

- Consider a function  $g$  whose contour lines are shown below

- [1] Estimate a local minimum.

- [2] Sketch the direction of  $\nabla g(1, 0)$ .

- [1] Let  $\vec{u} = \langle \frac{1}{\sqrt{2}}, \frac{-1}{\sqrt{2}} \rangle$ . Find a point  $(c, d)$  where  $D_{\vec{u}}g(c, d) > 0$

