

Name: _____

Worksheet #19

Math 221

Instructions. Put the your first and last name at the top of your paper. Everyone is to do their own worksheet but only one from each group is graded with the score shared. Be sure to **explain your reasoning**.

1. In a murder investigation, the temperature of the corpse was 32.5°C at 1:30 PM and 30.3°C an hour later. Normal body temperature is 37.0°C and the temperature of the surroundings was 20.0°C . When did the murder take place?
2. You are blowing up a spherical balloon by blowing air into it at a rate of 8 cubic inches per second. How fast is the radius of the balloon increasing when it is 1 inch? What about when it is 5 inches?
3. Find the equation of the tangent line to the curve $xy + x + y + \sin(xy) = 1$ at the point $(0, 1)$.
4. Show that the sum of a positive number with its reciprocal is always at least 2.
5. Determine the minimal distance from a point on the graph of $y = 4 - x^2$ to the origin.
6. Find the critical points of $f(x) = \frac{x-1}{x^2+1}$ and determine if they are local or global maxima or minima.
7. Determine the limit if it exists.

(a) $\lim_{x \rightarrow \infty} \frac{xe^x}{e^{2x} + 3}$

(b) $\lim_{x \rightarrow 0^+} (\sin x)(\ln x)$

(c) $\lim_{x \rightarrow 0^+} x^{\sqrt{x}}$