MATHEMATICS 133, FALL 2020, QUIZ 2

Directions: The answers to this quiz are to be submitted to the instructor of your discussion section by **11:59 P.M.** on Wednesday, November 25. Please include your name, student identification number, and discussion section number on the worked out quiz.

1. Take the last four digits **ABCD** of your student identification number, and consider the point in the coordinate plane given by $\mathbf{X = (A + B, C + D)}$; let $\mathbf{Y = (0, 0)}$ and $\mathbf{Z = (25, 0)}$. Find the coordinates for the point **W** where the bisector of angle **YXZ** meets the segment **(YZ)**. [***Hint:*** There is a theorem in the notes which can be used. Find it and cite it in your solution.]

2. Consider the angle formed by the nonnegative $\boldsymbol{x}$ – axis and the portion of the line $\boldsymbol{y = mx}$ in the first quadrant of the coordinate plane, where $\boldsymbol{m > 0}$. The bisector of this angle is the union of the nonnegative $\boldsymbol{x}$ – axis and some ray in the first quadrant defined by an equation of the form $\boldsymbol{y = kx}$ for some uniquely determined $\boldsymbol{k > 0}$. Derive an identity for $\boldsymbol{k}$ as a function $\boldsymbol{m}$.

In the second part, you may find the following link helpful:

Tangent half-angle formula - Wikipedia

You should be able to derive a formula for $\boldsymbol{k}$ in terms of $\boldsymbol{m}$ from one of the identities in this reference.

As in the first quiz, you may use a calculator or simple programmable device to work the first part. Any valid approach to finding the answers is acceptable (but you may be asked to justify a procedure if it is nonstandard). Although you may consult with other students about material related this problem, the quiz is **NOT** collaborative; the answers you submit must be your own work and no one else's.