Dawson College: Winter 2019: Linear Algebra (SCIENCE): 201-NYC-05-S6: **Quiz 8** name: _____

No books, watches, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work.

Question 1. *(5 marks)* Using vectors prove that the line segment joining the midpoints of two sides of a triangle is parallel to the third side and half as long.

Question 2. *(5 marks)* Prove the parallelogram law for the norm:

$$||\vec{a}+\vec{b}||^2 + ||\vec{a}-\vec{b}||^2 = 2||\vec{a}||^2 + 2||\vec{b}||^2$$

for all vectors in $\mathbb{R}^n$.

Question 3. Given the line $y = x + 2$ which is a tangent of the circle with centre C. The vector $\vec{v}$ has initial point C and terminal point B which lies both on the circle and the tangent.
note: A tangent to a circle is perpendicular to the radius at the point at which the tangent and circle intersect.

a. *(1 mark)* Find the centre C of the circle.

b. *(4 marks)* Find the point B.

c. *(1 mark)* Find the equation of the circle.