

Midterm I

MATH 148

Wednesday, October 5, 2038

16:75 – 17:75 pm Founders Auditorium

Instructions: Show all work. Failure to show work may result in loss of credit. Write your solutions in the space provided on the *answer sheets*. Do *not* hand in scratch paper. There are eight questions. You may use your graphing calculators (*not* those with CAS capabilities!); if you do, you *must* sketch the graph, label the relevant curve(s) and points and give the viewing window in which you obtained the graph. Decimal number approximations are acceptable *only in questions 5, 6 and 7*. Please remember to *simplify* your answers. Some partial credit *may* be given. **Good Luck!**

- 1) Solve $A = 2ab + 2ac + 2bc$ for c . Find the exact value of c when $a = 3$, $A = 3$, $b = 7$.
- 2) (a) Find the distance between the points $(-7, -9)$ and $(9, 3)$.
(b) Find the midpoint of the line segment between the points $(0, 9)$ and $(-3, 7)$.
- 3) Find the vertex of the equation $y = -9x^2 + 6x + 23$ and state whether it is a maximum or a minimum.
- 4) Solve the following system of equations. You may use any method, but the solution must be *exact*, not just a decimal approximation.
$$\begin{aligned} 3x^2 + y^2 &= 4 \\ 2x - y &= -1 \end{aligned}$$
- 5) Graph the equation $y = 3x^3 + x^2 - x + 7$. Find: (a) The maximum value of y subject to the constraint $-4 \leq x \leq 0$; (b) The minimum value of y subject to $0 \leq x \leq 5$. (Round your answers to 2 decimal places).
- 6) A box with a square base and no top is to be made from a square sheet of aluminum by cutting out 6-inch squares from each corner and folding up the sides. If the box is to have a volume of 726 cubic inches, what size should the sheet of aluminum be?
- 7) Find the minimum distance from the graph of $y = 2x^3 - 6x$ to the point $(1, -3)$.
- 8) Let $f(x) = \sqrt{17x + 35}$. (a) Find the domain of f . (b) Find $f(1)$ and $f(4)$. (Only exact solutions are acceptable!).

Question # n is worth $\frac{25 + (-1)^n}{2}$ points.

All numerical answers must be accurate to at least two decimal places.

You are welcome to keep this *Questions Sheet* for your files.