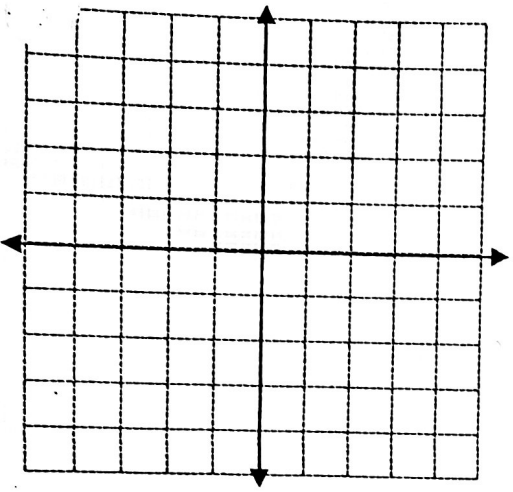
MCV 4U – Grade 12 Calculus & Vectors, University Preparation

1. [K4A3C1] Graph and find the points on $y = 2x^2 - 1$ so the tangents pass through (-2,5).



2. [A4C1] Find the maximum area of the rectangle between $y = \frac{1}{2}x^2 - \frac{3}{2}$ and the x-axis.

3. [K1A3] Tyler's plane leaves Pearson Airport at 10 AM heading south at 750 km/h at the same time that Kyle's plane heads east for Pearson 1000 km away at 800 km/h. Find the minimum distance between them.

4. [12] Analyze each graph.

$y = x^3 - 3x^2 - 24x + 9, -5 \le x \le 5$

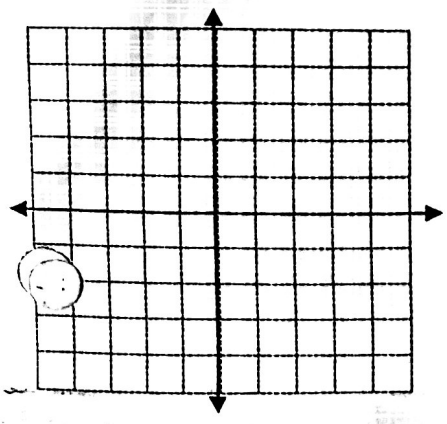
RELATIVE MAXIMUM/MINIMUM

ABSOLUTE MAXIMUM/MINIMUM

POINT OF INFLECTION

INTERVALS OF INCREASE/DECREASE

INTERVALS OF CONCAVITY

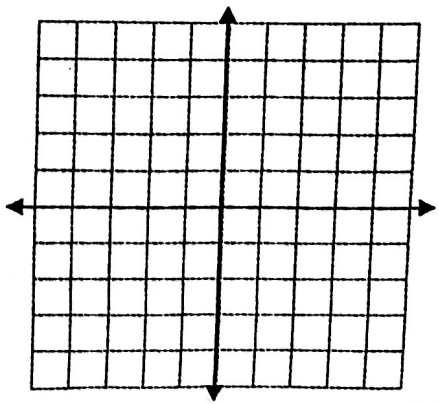


b) $y = \dfrac{2}{x^2 - x - 2}$

ASYMPTOTES

INTERCEPT

INTERVALS OF CONCAVITY



5. [2] Find the relative maximum point for question 4b.

6. [4] State and sketch a rational function that is never concave down.

[5] Isabelle needs 600 cm^2 of aluminum to make a can of icing. Determine the maximum volume.

8. [7] Find the minimum amount of time: Jack can jog 5 m/s along the beach and swim 3 m/s to a point 100 m along th beach and 40 m out in the water.

9. [6] Determine the maximum area: Alex uses 100 m of fence to enclose two adjacent rectangular fields.

10. [7] Find the minimum cost to make a 2 L can of corn. The top and bottom cost 0.0002\$/cm^2 and the side costs 0.00003\$/cm^2.

11. [5] The cost in c dollars per kilometre for driving a truck at v km/h is $c(v) = \frac{17}{20} + \frac{\sqrt{v^3}}{2500}$. The driver is paid \$15/hr. Find the minimum cost for a 1500 km trip.

12. [5] Find the maximum volume: