



Name: _____

Mark:
25

MATH 100

Assignment 4

1. Evaluate the limits. If they do not exist, then determine whether they are ∞ or $-\infty$ or neither.

(a) (2 marks) $\lim_{x \rightarrow -\infty} \frac{\sqrt{x^2 + 2}}{3x - 9}$

(b) (1 mark) $\lim_{x \rightarrow \infty} \frac{2 \cos(5x + 3)}{x}$

2. (3 marks) Find the equations of any horizontal, slant or vertical asymptotes of the graph of

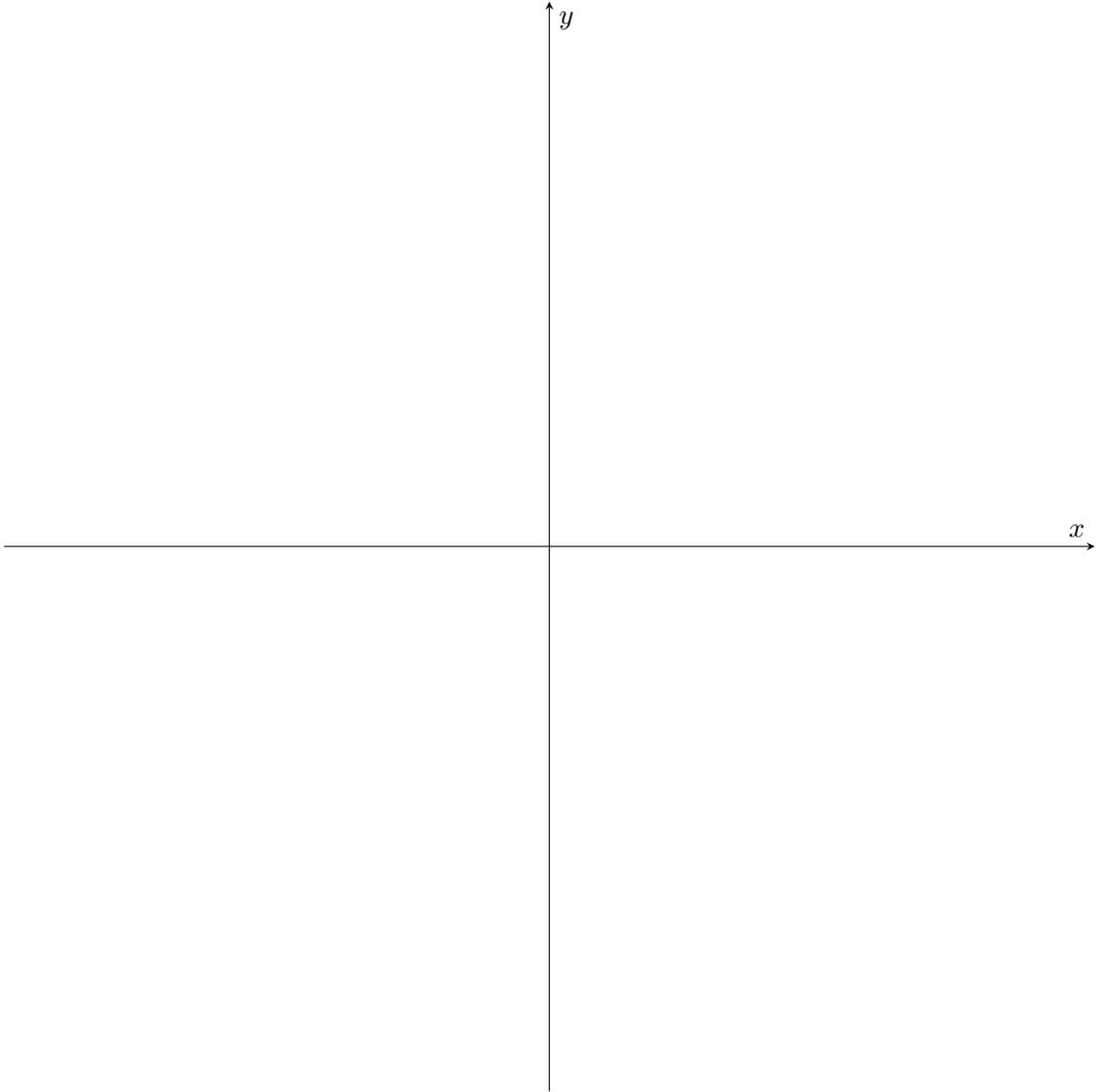
$$f(x) = \frac{2x^4 - 8x^3 + 3x - 12}{x^3 - 2x^2 - 8x}.$$

3. (6 marks) Let

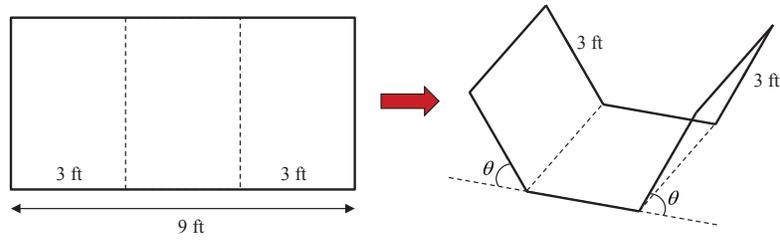
$$f(x) = \frac{x^2 + x - 2}{x^2}.$$

- (a) Fully analyze f by finding its domain, intercepts, asymptotes, relative extrema and points of inflection, by testing it for symmetry, and by finding the intervals on which it is increasing or decreasing and where its graph is concave upward or concave downward.

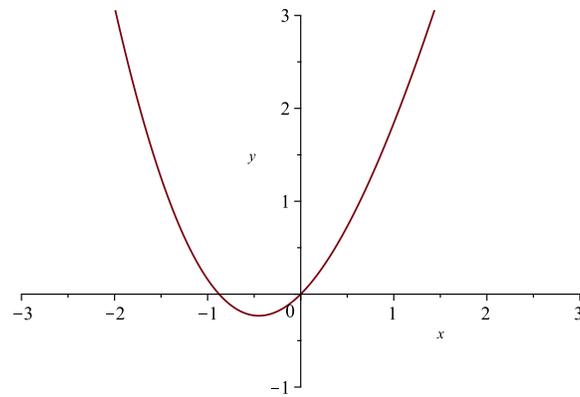
- (b) Using your analysis from part (a), sketch the graph of f . Label any intercepts, relative extrema, points of inflection and asymptotes on your graph.



4. (4 marks) A 9 ft wide sheet of metal is used to make a water trough by bending up, at an angle θ , a 3 ft wide strip on each side. What angle θ would maximize the cross-sectional area, and therefore the volume, of the trough?



5. (3 marks) Find the zeros of $f(x) = x^2 + \sin x$. Use Newton's Method to approximate to at least 8 decimal places any zeros that cannot be found analytically.



6. (3 marks) Use differentials or a linear approximation to approximate $7.98^{2/3}$. Express your answer as a fraction reduced to lowest terms.

7. (3 marks) The area of an equilateral triangle having sides of length x is $A = \frac{\sqrt{3}}{4}x^2$.

(a) Express the area A of the triangle as a function of its perimeter P .

(b) Suppose the perimeter of the triangle is measured to be 50 cm with a possible error of 0.75 cm. Then using differentials, approximate the possible *propagated* and *percent* errors in computing the area of the triangle.