

Problem 1. Let $f(x) = \frac{3x^2}{18 - 2x^2}$.

(a) Find the x -intercept. (1 point.)

Solution. It suffices to find the values of x that make the numerator zero. Hence, we set $3x^2 = 0$, from which we conclude that $(0, 0)$ is the only x -intercept.

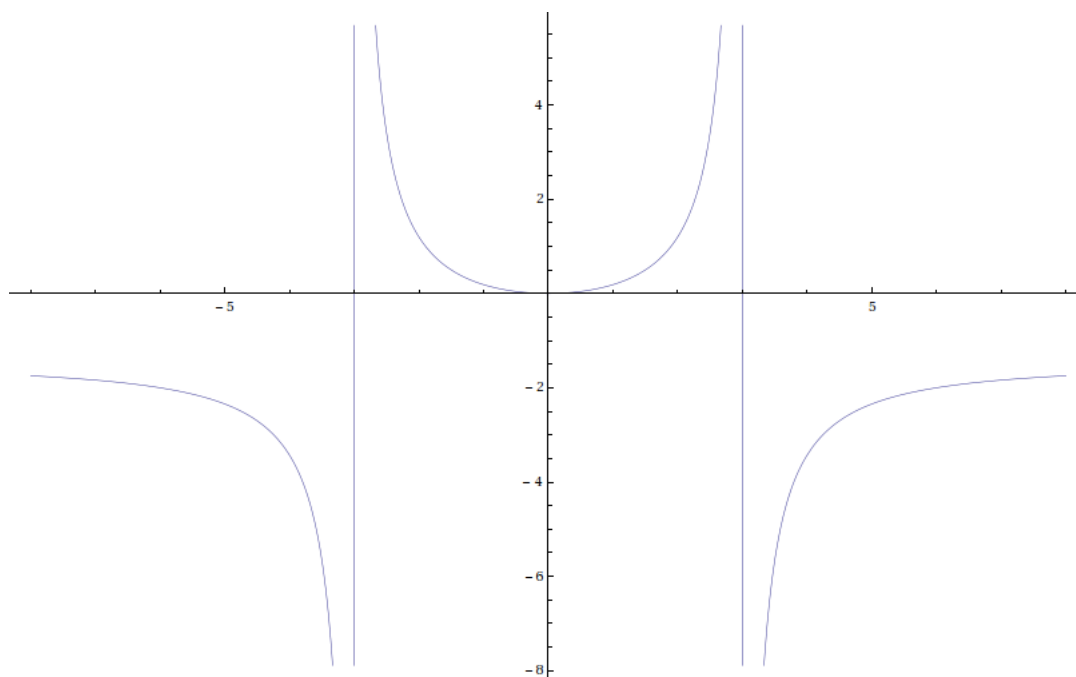
(b) Find the vertical asymptotes. (2 points.)

Solution. It suffices to find the values of x that make the denominator zero. Hence, we set $18 - 2x^2 = 0$. Factoring the expression, we get $18 - 2x^2 = 2(9 - x^2) = 2(3 - x)(3 + x)$. We conclude that $x = 3$ and $x = -3$ are the vertical asymptotes.

(c) Find the horizontal asymptote. (2 points.)

Solution. The numerator and the denominator have the same degree, hence we only need to compare the leading coefficients. $y = \frac{3}{-2} = -\frac{3}{2}$ is the horizontal asymptote.

(d) Use the information above along with a few additional points to sketch the graph below. (5 points.)



(Point assignment: 1 point for having the correct shape for the middle part; 1 point for having the correct shape for the left and right parts; 1 point for hitting the x intercept; 1 point for conforming to the horizontal asymptote; 1 point for conforming to the vertical asymptotes)