

MATH 101 QUIZ 6

1. Find the limit

$$\lim_{x \rightarrow 0} (1 - 3x^2)^{-\csc^2 x}.$$

2. Let

$$f(x) = \frac{2x^2 + 30}{x + 1}.$$

- (1) Find all critical points of f and argue whether they are local maxima, local minima or neither of them.
- (2) Find all asymptotes (vertical, horizontal, slant), if there exist.

3. Find the shortest length of the line segment that is cut off by the first quadrant and is tangent to the curve $y = 3/x$ at some point.

4. A ball is thrown upward with a speed 22 m/s at the top of 15 m high building. Let us assume that the gravitational acceleration is 10 m/s². When does the ball hit the ground?