MATH 110-001, QUIZ 4

March 9, 2018

Time: 15 minutes

Show all your work. No calculators, no books/notes are allowed.

Name (please print): _____

Student number: _____

1. (a) Find the following limit. (Show your work.)

$$\lim_{x\to\infty} x \sin\left(\frac{1}{x}\right)$$

(b) Use part (a) and determine the horizontal asymptote(s) of the function $f(x) = x \sin\left(\frac{1}{x}\right)$.

2. The problem $\lim_{x\to 0} \dfrac{3x}{2x^2+x}$ appeared on a test.

• Student A determined that the limit was an indeterminate $\frac{0}{0}$ form and applied l'Hopital's rule twice to get:

$$\lim_{x\to 0} \frac{3x^2}{2x^2+x} = \lim_{x\to 0} \frac{6x}{4x+1} = \lim_{x\to 0} \frac{6}{4} = \frac{6}{4}$$

• Student B also determined that the limit was an indeterminate $\frac{0}{0}$ form and applied l'Hopital's rule too to get:

$$\lim_{x\to 0} \frac{3x^2}{2x^2+x} = \lim_{x\to 0} \frac{6x}{4x+1} = \lim_{x\to 0} \frac{0}{0+1} = 0$$

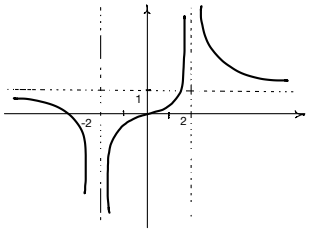
Which student was correct? Why?

My silly mistake in this question!
Check the solution.

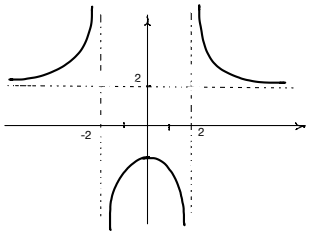
3. Choose the graph that matches with the function

$$f(x) = \frac{2x^2}{x^2-4}$$

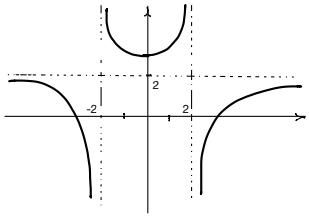
and give a brief explanation for your choice. (You do NOT need to compute f' or f''.)



(A)



(B)



(C)

Your explanation can be in terms of mathematical formulas.