## MAT 131 FALL 2012 Practice MIDTERM II

NAME :

ID :

**RECITATION NUMBER:** 

# THERE ARE SIX (6) PROBLEMS. THEY HAVE THE INDICATED VALUE. SHOW YOUR WORK DO NOT TEAR-OFF ANY PAGE

#### NO CALCULATORS NO CELLS ETC.

ON YOUR DESK: ONLY test, pen, pencil, eraser.

1	40pts
2	40pts
3	40pts
4	$50 \mathrm{pts}$
5	40pts
6	40pts
Total	250pts

### **!!!** WRITE YOUR NAME, STUDENT ID AND LECTURE N. BELOW **!!!**

NAME :

ID :

LECTURE N.

1. (40pts)

**a.** State the Squeeze Theorem.

**b.** Prove that  $\lim_{x\to 0^+} \sqrt{x}e^{\cos(\pi/x)} = 0.$ 

Sketch the graph of an example of a function f(x) that satisfies all of the given conditions.

 $\lim_{x\to 1^-} = 1 \qquad \qquad \lim_{x\to 1^+} = -\infty \qquad \qquad \lim_{x\to 3^-} = 0$ 

 $\lim_{x \to 3^+} = \text{does not exist} \qquad f(1) = 0 \qquad f(3) = 2.$ 

(a) Find the number c such that the limit below exists.

$$\lim_{x \to -2} \frac{x^2 + cx + c - 3}{x^2 + 2x}$$

(b) Calculate the limit for the value of c in part (a).

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Consider the function

$$f(x) = \frac{1}{1 + e^{1/x}}.$$

(a) Calculate the limits

 $\lim_{x \to 0^-} f(x), \quad \lim_{x \to 0^+} f(x).$ 

(b) Calculate the limits

$$\lim_{x \to -\infty} f(x), \quad \lim_{x \to +\infty} f(x).$$

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(a) State what are the vertical and horizontal asymptotes of a function.

(b)Find vertical and horizontal asymptote of the function

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

Let  $f(x) = x^3 - 3x + 2$ .

(a) Use the definition to calculate f' and f''. (hint:  $(x+h)^3 = x^3 + 3x^2h + 3xh^2 + h^3$ )

(b) On which interval is f(x) increasing? On which interval is f(x) concave upward? On which interval is f(x) concave downward?

(c) Sketch the graph of f(x), f'(x) and f''(x) in the same picture.