Ryerson University
Department of Mathematics
MTH 140 Fall 2008 – Test I

LAST NAME: _____ FIRST NAME: _____
(Please print) (Please print)

I.D. NUMBER:_____ SIGNATURE:_____

Date: September 26, 2008 Duration: 70 min. **Version: White 556-AY♣♭**

Please indicate your section (check the appropriate box):

Prof. Ha: ☐ Sec. 011 ☐ Sec. 021 ☐ Sec. 031 ☐ Sec. 041 ☐ Sec. 051

Prof. Wang: ☐ Sec. 061 ☐ Sec. 071 ☐ Sec. 081 ☐ Sec. 091

Prof. Ferrando: ☐ Sec. 101 ☐ Sec. 111 ☐ Sec. 121 ☐ Sec. 131 ☐ Sec. 141

Prof. Pascal: ☐ Sec. 151 ☐ Sec. 161 ☐ Sec. 171 ☐ Sec. 181 ☐ Sec. 191

Prof. Bonato: ☐ Sec. 201 ☐ Sec. 211 ☐ Sec. 221 ☐ Sec. 231

INSTRUCTIONS:

- Verify that your exam has 7 pages including this page.
- The use of notes, formula sheets, books or calculators is not allowed.
- For full-answer questions:

  Give full justification for your answers; correct answers alone may be worth nothing. Cross out or erase all rough work not relevant to your solution. Write your solutions in the space provided. If you need more space, use the back of the page. Indicate this fact on the original page, making sure that your solution cannot be confused with any rough work which may be there.
- For multiple choice questions:

  Make sure to write your answers in the box at the end of each question carefully. There are no part marks in the multiple-choice section and only the answer in the box will be marked. The correct response gets full marks, an incorrect response or no response gets no marks.

For markers' use only:

Page	Value	Mark
2	6	
3	5	
4	6	
5	5	
6	7	
7	6	
Total	35	

MTH 140 Test I

1. (2 pts.) (multiple-choice question) Suppose f is continuous on $[0,1]$ and $f(0) = 1$ and $f(1) = 4$. What can be said about the equation $f(x) = 2$ for x in the interval $(0,1)$?

Select the correct answer.

A) The equation $f(x) = 2$ has a solution in the interval $(0,1)$.
B) The equation $f(x) = 2$ does not have a solution in the interval $(0,1)$.
C) The given information is insufficient for determining whether the equation $f(x) = 2$ has a solution in the interval $(0,1)$.

Write the letter(capital) of the answer in this box $\longrightarrow$ 1. $\boxed{\big)}$

2. (4 pts.) Let

$$f(x) = \begin{cases} \dfrac{x^2+5}{x+2} & \text{if } x < 1 \\ 1 & \text{if } x = 1 \\ 2 - x\ln x & \text{if } x > 1 \end{cases}$$

Is f continuous at 1? Justify your answer.

Answer:
Option 1: f is continuous at 1. *Check this box* ☐

Option 2: f has a discontinuity at 1. *Check this box* ☐

3. (2 pts.) (multiple-choice question) Find the domain of the function

$$f(x) = \frac{\ln x}{1 - \sqrt{3 - x}}$$

Select the correct answer.

A) $x \in (0, 3)$ **B)** $x \in [0, 3)$

C) $x \in (0, 1) \cup (1, 3)$ **D)** $x \in [0, 2) \cup (2, 3]$

E) $x \in (0, 2) \cup (2, 3]$

Write the (capital) letter of the answer in this box $\longrightarrow$ 3. $\boxed{}$

4. (3 pts.) Find the following limit.

$$\lim_{x \to -2} \frac{1}{x + 2} \left(\frac{1}{2} - \frac{1}{\sqrt{x + 6}} \right)$$

answer: $\boxed{}$

5. (2 pts.) (multiple-choice question) Find the limit $\lim_{x\to 0^+} \tan^{-1}(\ln x)$

Select the correct answer.

A) ∞ **B)** $-\infty$

C) 0 **D)** $-\frac{\pi}{2}$ **E)** $\frac{\pi}{2}$

Write the (capital) letter of the answer in this box ⟶ 5. [ ]

6. (4 pts.) Find a formula for the inverse of the function $f(x) = \ln(1 + e^{2x})$.

answer: [ ]

7. (2 pts.)(multiple-choice question) Suppose $4x - 2x^2 - 4 \leq f(x) \leq x^2 - 2x - 1$ for $x \geq 0$. Consider $\lim_{x \to 1} f(x)$.

Select the correct answer.

A) $\lim_{x \to 1} f(x) = -4$ **B)** $\lim_{x \to 1} f(x) = -2$

C) $\lim_{x \to 1} f(x) = -1$ **D)** $\lim_{x \to 1} f(x) = -\frac{3}{2}$

E) The given information is insufficient for determining $\lim_{x \to 1} f(x)$

Write the (capital) letter of the answer in this box ⟶ 7. [ ]

8. (3 pts.) Find the following limit.

$$\lim_{x \to -\infty} \frac{(3x+1)\sqrt{4x^2-1}}{5x^2+1}$$

answer: [ ]

9. (2 pts.)(multiple-choice question) Simplify the expression $\sec(\sin^{-1} x)$.

Select the correct answer.

A) $\dfrac{1}{\sqrt{1-x^2}}$ **B)** $\sqrt{x^2+1}$

C) $\dfrac{1}{\sqrt{x^2-1}}$ **D)** $\dfrac{x}{\sqrt{1-x^2}}$

E) $\sqrt{1-x^2}$

Write the (capital) letter of the answer in this box ⟶ 9. ☐)

10. (5 pts.) Consider the curve $y = \dfrac{x^2-16}{x^2-6x+8}$

a) Find all the horizontal asymptotes of the curve.

answer: ☐

b) Find all the vertical asymptotes of the curve.

answer: ☐

11. (2 pts.) (multiple-choice question) Find the limit

$$\lim_{x\to 2^+} \frac{4-x^2}{|2-x|}$$

Select the correct answer.

A) -4 **B)** 4

C) 2 **D)** -2

E) Limit does not exist

Write the (capital) letter of the answer in this box ⟶ 11. ⎛ ⎞

12. (4 pts.) Is there a number a such that

$$\lim_{x\to -3} \frac{x^2+ax+a-1}{x^2+x-6}$$

exists? If so, find the value of a and the value of the limit.

Answer:

Option 1: The limit does not exist for any value of a. *Check this box* ☐

Option 2: $a =$ limit=