

University of Saskatchewan  
Department of Mathematics and Statistics  
Midterm I Examination

May 23, 2006

Math 110.3

Time: 60 minutes

Closed book. No calculators. No formula sheets.

Print your name clearly and write your student ID number on the opscan sheet. Encode your answers carefully on the opscan sheet. Use the provided examination booklets as a scrap paper only! Solutions in the examination booklets that are not copied onto the opscan sheet will NOT be graded!

Each question has equal mark. There is only one correct answer to each question. Total number of points: 15

- Solve for  $x$ :  $|2x + 1| \leq 3$ .  
A)  $(-\infty, -2]$       B)  $[-\infty, 1)$       C)  $[-2, 1]$   
D)  $(-2, 1)$       E)  $[1, \infty)$       F)  $(1, \infty)$   
G)  $(-\infty, -2] \cup [1, \infty)$       H)  $(-\infty, -2) \cup (1, \infty)$
- Solve for  $x$ :  $x^2 + x - 1 < 0$ .  
A)  $(-1, 1)$       B)  $[-1, 1]$   
C)  $(-\infty, -1) \cup (1, \infty)$       D)  $(-\infty, 1] \cup [1, +\infty)$   
E)  $(\frac{-1-\sqrt{5}}{2}, \frac{-1+\sqrt{5}}{2})$       F)  $[\frac{-1-\sqrt{5}}{2}, \frac{-1+\sqrt{5}}{2}]$   
G)  $(-\infty, \frac{-1-\sqrt{5}}{2}] \cup [\frac{-1+\sqrt{5}}{2}, \infty)$       H)  $(-\infty, \frac{-1-\sqrt{5}}{2}) \cup (\frac{-1+\sqrt{5}}{2}, \infty)$
- Find an equation of the line parallel to the line  $y = 2x + 5$  and passing through  $(-1, 0)$ .  
A)  $y + 1 = 2x$       B)  $y + 1 = -\frac{1}{2}x$       C)  $y + 5 = 2x$   
D)  $y - 5 = 2x$       E)  $y = 2(x + 1)$       F)  $y = 2(x + 5)$   
G)  $y = 2(x - 5)$       H)  $y = 2x$
- Find all the values of  $x$  in the interval  $[0, 2\pi]$  that satisfy the inequality  $\sin x \leq \frac{\sqrt{3}}{2}$ .  
A)  $[0, \frac{\pi}{3}] \cup [\frac{2\pi}{3}, 2\pi]$       B)  $[\frac{\pi}{3}, \frac{2\pi}{3}]$       C)  $[0, \frac{\pi}{3}]$       D)  $[0, \frac{\pi}{6}] \cup [\frac{5\pi}{6}, 2\pi]$   
E)  $[\frac{\pi}{6}, \frac{5\pi}{6}]$       F)  $[0, \frac{5\pi}{6}]$       G)  $[\frac{5\pi}{6}, 2\pi]$       H)  $[0, \frac{\pi}{6}] \cup [\frac{5\pi}{6}, \pi]$
- Find the domain of the function  $f(x) = \frac{x}{\sqrt{x+2}-1}$ .  
A)  $[-2, \infty)$       B)  $(-2, \infty)$       C)  $[-2, -1) \cup (-1, \infty)$   
D)  $(-2, -1) \cup (-1, \infty)$       E)  $[-1, \infty)$       F)  $(-1, \infty)$   
G)  $[-1, 2) \cup (2, \infty)$       H)  $(-1, 2) \cup (2, \infty)$

6. Which of the following functions below has a graph obtained from the graph of  $y = \sin x$  by shifting it upwards by 5 units, then to the left by  $\frac{\pi}{2}$  units and reflecting about the  $x$  axis?
- A)  $y = -\sin(x - \frac{\pi}{2}) + 5$     B)  $y = -\sin(x + \frac{\pi}{2}) + 5$   
 C)  $y = -\sin(x + \frac{\pi}{2}) - 5$     D)  $y = -\sin(-x + \frac{\pi}{2}) - 5$   
 E)  $y = \sin(-x - \frac{\pi}{2}) + 5$     F)  $y = \sin(-x + \frac{\pi}{2}) + 5$   
 G)  $y = -\sin(-x - \frac{\pi}{2}) + 5$     H)  $y = -\sin(x - \frac{\pi}{2}) - 5$
7. Find the domain of the function  $f \circ g$  if  $f(x) = -\sqrt{x}$  and  $g(x) = x^2$ .
- A)  $[0, \infty)$     B)  $(-\infty, 0]$     C)  $(0, \infty)$     D)  $(-\infty, 0)$   
 E)  $(-\infty, \infty)$     F)  $[0, 1]$     G)  $[-1, 0]$     H) empty set
8. Solve for  $x$ :  $\log_{\frac{1}{3}}(x - 1) \leq -1$ .
- A)  $[0, 4]$     B)  $[4, \infty)$     C)  $(0, 4]$     D)  $[0, 4)$   
 E)  $(0, 4)$     F)  $[\frac{1}{3}, \infty)$     G)  $[0, \frac{1}{3}]$     H)  $[\frac{1}{3}, 4)$
9. Find  $\sin(\frac{\pi}{2} + x)$  if  $\tan^{-1} x = 0$ .
- A) 0    B) -1    C) 1    D)  $\frac{\pi}{2}$     E)  $-\frac{\pi}{2}$     F)  $\frac{1}{2}$     G)  $-\frac{1}{2}$     H)  $\sqrt{3}$
10. Find the exact value of the expression  $\sin(\cos^{-1}(\frac{1}{2}))$ .
- A)  $\frac{1}{2}$     B)  $\frac{\pi}{2}$     C)  $\frac{\pi}{3}$     D) 1    E)  $\frac{\sqrt{3}}{2}$     F) -1    G)  $-\frac{1}{2}$     H)  $-\frac{\sqrt{3}}{2}$
11. Find the range of the function  $f(x) = \frac{4x-1}{2x+3}$ .
- A)  $(-\infty, \infty)$     B)  $(-\infty, -\frac{3}{2})$     C)  $(-\frac{3}{2}, \infty)$     D)  $(-\infty, -\frac{3}{2}) \cup (-\frac{3}{2}, \infty)$   
 E)  $(2, \infty)$     F)  $(4, \infty)$     G)  $(2, 4)$     H)  $(-\infty, 2) \cup (2, \infty)$
12. Find  $\lim_{x \rightarrow 2} \frac{x^2+x-6}{x-2}$ .
- A) 0    B) 2    C) 6    D) -6    E) -2    F) 5    G)  $-\infty$     H)  $\infty$
13. Find  $\lim_{x \rightarrow 9} \frac{x^2-81}{\sqrt{x}-3}$ .
- A) 108    B) -108    C) 96    D) -96    E) 27    F) -27    G) 3    H) 1
14. Find  $\lim_{x \rightarrow 0} x \sin \frac{\pi}{x}$ .
- A) 1    B) -1    C)  $\pi$     D)  $\frac{\pi}{2}$     E)  $\infty$     F)  $-\infty$     G) 0    H)  $\frac{\sqrt{3}}{2}$
15. Find  $\lim_{x \rightarrow 1^-} \frac{1}{x-1}$ .
- A) 0    B) 1    C) 1    D)  $\infty$     E)  $-\infty$     F)  $\frac{1}{2}$     G)  $-\frac{1}{2}$     H) **D. N. E.**