University of Saskatchewan
Department of Mathematics and Statistics
Practice Test II
May 26, 2006, Math 110.3, Instructor: Pawel Gladki, 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

1. Find the limit $\lim_{x\to 5} \frac{x^4-625}{x-5}$.
   A) 100 B) 25 C) 625 D) 125 E) 500 F) 4 G) ∞ H) $-\infty$

2. Find the limit $\lim_{x\to\infty} \frac{\sin x}{x}$.
   A) 0 B) 1 C) -1 D) ∞ E) $-\infty$ F) $\frac{\pi}{4}$
   G) $\frac{\sqrt{2}}{2}$ H) **D. N. E.**

3. For which value of the constant c the following function is continuous on $(-\infty, \infty)$:
$$f(x) = \begin{cases} \sin x, & \text{if } x \leq 0 \\ \cos(x+c), & \text{if } x > 0 \end{cases}$$
   A) 0 B) $\frac{\pi}{2}$ C) $\frac{\pi}{4}$ D) $\frac{\pi}{6}$ E) 1 F) -1 G) $\frac{\sqrt{3}}{2}$ H) $-\frac{\sqrt{3}}{2}$

4. Find the limit $\lim_{x\to-\infty}(\sqrt{9x^2+x} - 3x)$.
   A) **D. N. E.** B) 0 C) ∞ D) $-\infty$ E) $\frac{1}{6}$ F) $-\frac{1}{6}$
   G) $\frac{1}{3}$ H) $-\frac{1}{3}$

5. Which of the following lines are asymptotes of $f(x) = \frac{x^3-1}{(x^2-3x+2)\sqrt{x^2+1}}$.
   A) $x = 1$ and $x = 2$ B) $y = 1$ and $x = 1$
   C) $y = -1$ and $x = 1$ D) $x = 2$, $y = 1$ and $y = -1$
   E) $x = -2$, $y = 1$ and $y = -1$ F) $y = 0$
   G) $y = 0$, $x = 1$ and $x = 2$ H) $x = 3$, $x = 2$ and $y = 0$

6. Find $f'(7)$ if $f(x) = \frac{1}{\sqrt{x+2}}$.
   A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{1}{6}$ D) $-\frac{1}{2}$ E) $-\frac{1}{3}$ F) $-\frac{1}{54}$ G) 0 H) 1

7. Find $f'(0)$ if $f(x) = \pi x^4 + ex^3 + \sqrt{2}x^2 + x - \frac{5}{4}$.
   A) π B) e C) $\sqrt{2}$ D) 1 E) $\frac{1}{4}$ F) $-\pi$ G) 0 H) -1

8. Find $f'(x)$ if $f(x) = e^x \sin x$.
   A) $e^x(\sin x + \cos x)$ B) $e^x(\sin x - \cos x)$
   C) $e^x(-\sin x + \cos x)$ D) $e^x(-\sin x - \cos x)$
   E) $2e^x \sin x \cos x$ F) $\sin x$
   G) $\cos x$ H) e^x

9. Find $f'(x)$ if $f(x) = \frac{\tan x}{\sin 2x}$.
   A) $\frac{\sin x}{\cos 3x}$ B) $\frac{\sin x}{\cos^3 x}$ C) $\frac{\sin x}{3\cos x}$ D) $\frac{\sin x}{3\cos 3x}$
   E) $\frac{\sin x}{3\cos^3 x}$ F) $\frac{\sin x}{3\cos^3 3x}$ G) $-\frac{\sin x}{3\cos^3 3x}$ H) $\frac{3\sin x}{\cos^3 3x}$

10. Find $f'(x)$ if $f(x) = (x + e^x)(3 - \sqrt{x})$.
    A) $(1 + e^x)(-\sqrt{x})$ B) $(1 + e^x)(-\frac{1}{2\sqrt{x}})$
    C) $(1 + e^x)(\frac{1}{2\sqrt{x}})$ D) $(x + e^x)(\frac{1}{2\sqrt{x}})$
    E) $(1 + e^x)(3 - \sqrt{x})$ F) $(1 + e^x)(3 - \sqrt{x}) - \frac{x+e^x}{2\sqrt{x}}$
    G) $(1 + e^x)(3 - \sqrt{x}) + \frac{x+e^x}{2\sqrt{x}}$ H) $(1 + e^x)(3 - \sqrt{x}) + \frac{x-e^x}{2\sqrt{x}}$

11. Find $f'(x)$ if $f(x) = \frac{x^2}{3x^2-2x+1}$.
    A) $\frac{2x+2x^2}{(3x^2-2x+1)^2}$ B) $\frac{2x-2x^2}{(3x^2-2x+1)^2}$ C) $\frac{x+x^2}{(3x^2-2x+1)^2}$
    D) $\frac{x-x^2}{(3x^2-2x+1)^2}$ E) $\frac{2x+2x^2}{(3x^2-2x+1)}$ F) $\frac{2x-2x^2}{(3x^2-2x+1)}$
    G) $\frac{x+x^2}{(3x^2-2x+1)}$ H) $\frac{x-x^2}{(3x^2-2x+1)}$

12. Find $(fg)'(5)$ if $f(5) = 1$, $f'(5) = 6$, $g(5) = -3$, $g'(5) = 2$.
    A) 1 B) 6 C) 16 D) -16 E) -3 F) 2 G) -32 H) 32

13. Find the limit $\lim_{x\to 0} \frac{\sin 4x}{\sin 6x}$.
    A) $\frac{3}{2}$ B) $\frac{2}{3}$ C) $\frac{1}{6}$ D) 6 E) $\frac{1}{4}$ F) 4 G) 0 H) **D. N. E.**

14. Find an equation of the tangent line to the curve $y = \tan x$ when $x = \frac{\pi}{4}$.
    A) $y - \frac{\sqrt{3}}{2} = (x + \frac{\pi}{4})$ B) $y - \frac{\sqrt{3}}{2} = \frac{1}{2}(x - \frac{\pi}{4})$
    C) $y + \frac{\sqrt{3}}{2} = 2(x + \frac{\pi}{4})$ D) $y - \frac{\sqrt{2}}{2} = 2(x - \frac{\pi}{4})$
    E) $y + \frac{\sqrt{2}}{2} = 2(x - \frac{\pi}{4})$ F) $y - 1 = \frac{1}{2}(x - \frac{\pi}{4})$
    G) $y - 1 = 2(x - \frac{\pi}{4})$ H) $y - 1 = 2(x + \frac{\pi}{4})$

15. A particle is moving on the x axis and its distance from the origin is given by
$$s(t) = -\frac{2}{3}t^3 - \frac{5}{2}t^2 + 3t + 1 \text{ meters, } t \geq 0.$$
    When will the velocity of the particle be $0m/sec$?
    A) 3 B) -3 C) $\frac{1}{2}$ D) 1 E) 5 F) 7 G) $\frac{3}{4}$ H) 8

Answers: 1 E, 2 A, 3 B, 4 C, 5 D, 6 F, 7 D, 8 A, 9 B, 10 F, 11 B, 12 D, 13 B, 14 G, 15 C