Math 75A **Maria Nogin**

Practice test 2

The actual exam will consist of 6 multiple choice questions and 6 regular problems.
You will have 50 minutes to complete the exam.

Multiple choice questions: circle the correct answer

1. Solve for x: $\log_{\frac{1}{2}} x = 3$.

   A. 6 **B.** $\frac{1}{6}$ **C.** 8 **D.** $\frac{1}{8}$
   E. None of the above

2. How many vertical asymptotes does the curve $y = \dfrac{x+1}{x(x+2)(x+3)}$ have?

   A. 0 **B.** 1 **C.** 2 **D.** 3 **E.** 4

3. $\lim\limits_{x\to 2} \dfrac{5}{x-2} =$

   A. 0 **B.** 5 **C.** ∞ **D.** $-\infty$ **E.** Does not exist

4. $\lim\limits_{x\to -\infty} \dfrac{x+2}{3x+4} =$

   A. 1 **B.** $\frac{1}{2}$ **C.** $\frac{1}{3}$ **D.** 0 **E.** Does not exist

5. The function $f(x) = \begin{cases} -x-1 & \text{if } x < -1 \\ 0 & \text{if } -1 \le x \le 1 \\ x & \text{if } x > 1 \end{cases}$ is

   A. continuous everywhere
   B. continuous at 1 but discontinuous at -1
   C. continuous at -1 but discontinuous at 1
   D. continuous at all points except for 1 and -1
   E. discontinuous everywhere

6. Find the rate of change of $y = 3x + 5$ at $x = 4$.

   A. 3 **B.** 4 **C.** 5 **D.** 17
   E. None of the above

7. Find the equation of the line tangent to the curve $y = x^2$ at $(2, 4)$.

   A. $y = 4x$ **B.** $y = 4x - 4$ **C.** $y = 4x + 4$ **D.** $y = -4x$ **E.** $y = -4x - 4$

Regular problems: show all your work

8. Solve the following equations:

   (a) $\ln(5x-2)=3$

   (b) $e^{3t+1}=100$

   (c) $\log_2 t+\log_2(t+1)=1$

   (d) $10^{4x+1}=300$

9. Evaluate the limits:

   (a) $\lim_{x\to 5}(7x-25)$

   (b) $\lim_{x\to -1}\dfrac{x^3+x^2}{x^2+3x+2}$

   (c) $\lim_{x\to 0}\dfrac{3-\sqrt{9+x}}{x}$

   (d) $\lim_{x\to 2^+}\dfrac{x^3-2}{x^2-x-2}$

   (e) $\lim_{x\to 2^-}\dfrac{x^3-2}{x^2-x-2}$

   (f) $\lim_{x\to 2}\dfrac{x^3-2}{x^2-x-2}$

   (g) $\lim_{x\to 0}x^4\cos\left(\dfrac{1}{x}\right)$

   (h) $\lim_{x\to\infty}\dfrac{5x^3-x-3}{4x^3+3x^2-3}$

   (i) $\lim_{x\to -\infty}\dfrac{5x^2-x-3}{4x^3+3x^2-3}$

   (j) $\lim_{x\to\infty}\dfrac{5x^3-x-3}{4x^2+3x-3}$

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

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

   (m) $\lim_{x\to\infty}(3-x+2x^2-5x^3)$

   (n) $\lim_{x\to -\infty}(3-x+2x^2-5x^3)$

10. Show that the equation $x^5-4x+2=0$ has at least one solution in the interval $(1,2)$.

11. Find all values of c such that the function

(a) $f(x) = \begin{cases} cx & \text{if} \quad x \geq 2 \\ 5 - x & \text{if} \quad x < 2 \end{cases}$

(b) $f(x) = \begin{cases} x^2 & \text{if} \quad x \leq c \\ x^3 & \text{if} \quad x > c \end{cases}$

is continuous everywhere.

12. Find the vertical and horizontal asymptotes of $f(x) = \dfrac{(x+2)(3x-4)}{(x-5)(x+7)}$.

13. Find the following derivatives:

(a) $f'(1)$ if $f(x) = 5$

(b) $f'(2)$ if $f(x) = 7x - 3$

(c) $f'(3)$ if $f(s) = s^2 + 5s - 6$

(d) $f'(4)$ if $f(t) = \sqrt{t}$

(e) $f'(5)$ if $f(x) = \dfrac{2}{x}$