Math 75A **Maria Nogin**

Practice test 1

The actual test will consist of 6 multiple choice questions and 6 regular problems. You will have 1 hour to complete the exam.

Multiple choice questions: circle the correct answer

1. The function $f(x) = \sin(x) + x^2$ is

   A. even **B.** odd **C.** both even and odd **D.** neither even nor odd

2. If we shift the graph of $y = \sin(x)$ 2 units to the left, then the equation of the new graph is

   A. $y = \sin(x) + 2$ **B.** $y = \sin(x) - 2$ **C.** $y = \sin(x + 2)$ **D.** $y = \sin(x - 2)$

   E. $y = \sin(x/2)$

3. The domain of the function $f(x) = \dfrac{1}{\sqrt{x-1}}$ is the set of all real numbers x for which

   A. $x > 0$ **B.** $x \neq 0$ **C.** $x \geq 1$ **D.** $x > 1$ **E.** $x \neq 1$

4. Simplify $\dfrac{1+x}{x} - \dfrac{\frac{1}{x}+1}{x+1}$.

   A. 1 **B.** x **C.** $x + 1$ **D.** $\dfrac{1}{x}$ **E.** $\dfrac{x-1}{x+1}$

5. Let $f(x) = \begin{cases} -x-2 & \text{if } x < -1 \\ x-3 & \text{if } -1 \leq x \leq 1 \\ 2-x^2 & \text{if } x > 1 \end{cases}$. Find $f(1)$.

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

6. If $f(x) = 1 + x$ and $g(x) = x^2 - 6$, find $(f \circ g)(-2)$.

   A. -9 **B.** -7 **C.** -5 **D.** -1 **E.** Undefined

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

Regular problems: show all your work

8. Use transformations of functions to sketch the graphs of:

   (a) $(x-3)^2$

   (b) $3\cos x + 2$

   (c) $-\sin\left(x - \frac{\pi}{2}\right)$

   (d) e^{-x-1}

9. Find a formula for the function whose graph is obtained from the graph of $f(x) = e^x - 1$ by

   (a) Reflecting about the y-axis and then compressing horizontally by a factor of 2.

   (b) Vertically compressing by a factor of 5 and then shifting 3 units to the left.

   (c) Reflecting about the x-axis and then shifting 2 units down.

10. Let $f(x) = 2 - x$, $g(x) = \frac{1}{x}$, $h(x) = \sqrt{x+1}$. Find the following functions and their domains:

    (a) $f + g$

    (b) $f - g$

    (c) fg

    (d) $\frac{f}{g}$

    (e) $g \circ f$

    (f) $f \circ h$

    (g) $g \circ h$

    (h) $f \circ g \circ h$

11. Find the distance between $(-4, 3)$ and $(2, 11)$.

12. Write an equation of the circle

    (a) whose radius is 3 and center is at $(3, -4)$

    (b) whose center is at $(-2, 0)$ and that passes through the point $(1, 4)$

13. Write an equation of the line that

    (a) has slope 2 and passes through the point $(-1, 3)$

    (b) passes throught the points $(-1, 3)$ and $(0, -6)$

    (c) is parallel to the line $y = 7x - 1$ and passes through $(0, -6)$

    (d) is perpendicular to the line $y = 7x - 1$ and passes through $(0, -6)$

14. Evaluate the following expressions:

    (a) $\sin\left(\frac{\pi}{6}\right)$

    (b) $\cos\left(\frac{\pi}{4}\right)$

    (c) $\tan\left(-\frac{\pi}{3}\right)$

    (d) $\sec\left(\frac{2\pi}{3}\right)$

15. Evaluate the limits:

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

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

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

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

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

17. Find all values of c such that the function

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

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

    is continuous everywhere.