Math 75A **Maria Nogin**

Practice Final

Notes:

- This practice final and set Review (in WeBWorK) together cover all topics that may appear on the final. You are strongly encouraged to do both of these. Also, review all 3 tests, quizzes, and homework assignments (both on-line and from the book).
- If possible, please take the final exam with the section you are registered for.
  - The final for the section meeting 1-1:50 is on Monday, December 12, 1:15-3:15 PM.
  - The final for the section meeting 2-2:50 is on Wednesday, December 14, 3:30-5:30 PM.

  However, if you have a time conflict, let me know in advance, as soon as possible.
- The exam will consist of 25 multiple choice questions. Each question is worth 4 points, for a total of 100 points. You will receive credit if and only if you submit the correct answer. Your work will not be checked.
- You will have 2 hours to complete the exam.
- The final exam counts as 20 percent of your grade.
- Bring blank scratch paper, a pencil, and an eraser. Scantron forms will be provided.

1. If the graph of $f(x)$ passes through points $(5, 3)$, $(-3, 2)$, $(3, 4)$, and $(0, -3)$, then what is the value of $f(3)$?
   (a) 0
   (b) 2
   (c) 4
   (d) 5
   (e) Cannot be determined (given information is not sufficient)
2. Does the point $(-4, 0)$ lie on, above, or below the line $y = -\frac{1}{3}x + 1$?
   (a) On the line
   (b) Above the line
   (c) Below the line
   (d) Cannot be determined (given information is not sufficient)
   (e) None of the above

3. The domain of the function $f(x) = \sqrt{\dfrac{1-x}{1+x}}$ is the set of all real numbers x for which:
   (a) $x > 1$
   (b) $x \geq 1$
   (c) $-1 < x \leq 1$
   (d) $-1 < x$
   (e) $x \neq -1$
4. If $f(x) = \dfrac{1}{x^2}$ and $g(x) = \sqrt{x}$, then the domain of $f \circ g$ is
   (a) $(-\infty, \infty)$
   (b) $(0, \infty)$
   (c) $[0, \infty)$
   (d) $(-\infty, 0) \cup (0, \infty)$
   (e) None of the above
5. Which of the following functions is neither even nor odd?
   (a) $5 - x^2$
   (b) $2x + 7x^5$
   (c) $\sin x + 4x$
   (d) $\sin x + x^2$
   (e) $\cos x + 5$
6. Jason leaves Detroit at 2:00 PM and drives at a constant speed west along I-96. He passes Ann Arbor, 40 mi from Detroit, at 2:50 PM. Express the distance (in miles) traveled in terms of the time (in hours) elapsed.
   (a) $d = 40(t - 2)$
   (b) $d = 40t$
   (c) $d = 1.25t$
   (d) $d = 48t$
   (e) $d = \dfrac{4t}{5}$
7. The graph of $f(x) = \ln x$ is shifted 3 units upward and 2 units to the right. Which of the following is an equation of the new curve?
   (a) $y = \ln(x - 3) + 2$
   (b) $y = \ln(x + 3) - 2$
   (c) $y = \ln(x + 2) + 3$
   (d) $y = \ln(x - 2) + 3$
   (e) $y = \ln(x + 2) - 3$

8. Find the inverse function of $f(x) = .5x - 2$
   (a) $f^{-1}(x) = 2x + 4$
   (b) $f^{-1}(x) = 2x - 4$
   (c) $f^{-1}(x) = 1 + 2x$
   (d) $f^{-1}(x) = 1 - 2x$
   (e) None of the above
9. $\lim_{x \to 2} \dfrac{2x^2 - 5x + 2}{x^2 - x - 2} =$
   (a) 0
   (b) 1
   (c) 2
   (d) ∞
   (e) $-\infty$
10. Evaluate $\lim_{x \to 7} \dfrac{\sqrt{x+2} - 3}{x - 7}$.
   (a) 0
   (b) $\frac{1}{6}$
   (c) $\frac{1}{3}$
   (d) 1
   (e) ∞
11. The vertical and horizontal asymptotes for the function $f(x) = \dfrac{3 - x^2}{x^2 - 9}$ are
   (a) $x = 3$, $x = -3$, $y = -1$
   (b) $x = 3$, $y = -1$
   (c) $x = -1$, $y = 3$, $y = -3$
   (d) $x = -1$, $y = -3$
   (e) $x = 3$, $x = -3$
12. Find the value of k for which the function $f(x) = \begin{cases} \dfrac{x-9}{\sqrt{x}-3} & x \neq 9 \\ k & x = 9 \end{cases}$ is continuous at $x = 9$:
   (a) 0
   (b) -3
   (c) 3
   (d) 9
   (e) 6

13. Which of the following intervals contains a root of $x^3 + x - 5 = 0$?
    (a) $[-2, -1]$
    (b) $[-1, 0]$
    (c) $[0, 1]$
    (d) $[1, 2]$
    (e) $[2, 3]$

14. A particle moves along a straight line with equation of motion $s(t) = \sqrt{t+1}$. Find its average velocity over the time interval $[0, 3]$.
    (a) $\frac{1}{3}$
    (b) $\frac{1}{\sqrt{3}}$
    (c) $\frac{14}{9}$
    (d) 1
    (e) $-\frac{1}{12}$

15. Rewrite the function as a sum where each term is a constant times a power of x: $(5x^2 + \frac{1}{2x^3} + \frac{3}{\sqrt[3]{x}})\sqrt[3]{x^7}$
    (a) $5x^{17/7} - \frac{1}{2}x^{18/7} + 3x^7$
    (b) $5x^{17/7} + \frac{1}{2}x^{-18/7} + 3x^{2/21}$
    (c) $5x^{13/3} + \frac{1}{2}x^{-2/3} + 3x^2$
    (d) $5x^{13/3} - \frac{1}{2}x^{2/3} + 3x^2$
    (e) None of the above

16. If $f(x) = (\sqrt[3]{x})^2$, then $\frac{df}{dx} =$
    (a) $\frac{2}{3}x^{5/3}$
    (b) $\frac{2}{3x^{1/3}}$
    (c) $\frac{2}{3x^{-1/3}}$
    (d) $\frac{3}{5}x^{5/3}$
    (e) $\frac{3}{2}\sqrt{x}$

17. If $f(x) = \pi^3 + \dfrac{x}{\sqrt{x}}$, then $f'(x) =$

(a) $3\pi^2 + \dfrac{1}{\frac{1}{2}x^{-1/2}}$

(b) $3\pi^2 + \dfrac{1}{2\sqrt{x}}$

(c) $\dfrac{1}{2\sqrt{x}}$

(d) $\dfrac{\sqrt{x} - x\frac{1}{2}x^{-1/2}}{(\sqrt{x})^2}$

(e) $3\pi^2 + \dfrac{\sqrt{x} - x\frac{1}{2}x^{-1/2}}{(\sqrt{x})^2}$

18. Find all values of x at which the tangent line to the curve $y = \dfrac{(x-3)^4}{x^2-2}$ is horizontal.

(a) $\sqrt{2}$, 3

(b) 0, 3

(c) -4, 1, 3

(d) $-\sqrt{2}$, $\sqrt{2}$

(e) -4, 0, 2

19. If a ball is given a push so that it has an initial velocity of 2 m/s down a certain inclined plane, then the distance it has rolled after t seconds is $s = 2t + t^2$. How long does it take for the velocity to reach 24 m/s?

(a) 2 seconds

(b) 4 seconds

(c) 5 seconds

(d) 11 seconds

(e) 12 seconds

20. The cost function for a certain commodity is $C(x) = 84 + 0.16x - 0.0006x^2 + 0.000003x^3$. Find the marginal cost at the production level of $x = 100$.

(a) 0.13

(b) 0.14809

(c) 7.96

(d) 85.543

(e) 97

21. Simplify the expression: $\dfrac{1-\sin^2 x}{\cos x}(\sin x \tan x + \cos x)$

(a) 1

(b) $\sin x$

(c) $\cos x$

(d) $\tan x$

(e) None of the above

22. If $y = \cos(\cot x)$, then $\dfrac{dy}{dx} =$

(a) $-\sin(\cot x)$

(b) $-\sin(-\csc x \cot x)$

(c) $-\sin x \cot x - \cos x \csc x \cot x$

(d) $\dfrac{\cot x \cos x}{\sin x}$

(e) $\dfrac{\sin(\cot x)}{\sin^2 x}$

23. If $F(x) = f(g(x))$, $f(1) = 0$, $f'(1) = 5$, $f'(2) = -4$, $g(1) = 2$, $g'(0) = -6$, and $g'(1) = 3$, then $F'(1) =$

(a) -30

(b) -24

(c) -12

(d) 0

(e) 15

24. Solve the equation for $\dfrac{dy}{dx}$: $\dfrac{y^3}{y-1}\left(2x\dfrac{dy}{dx} + 1\right) = x(1+y)\dfrac{dy}{dx} + y^3$.

(a) $\dfrac{y-2}{x(2y^3+1-y^2)}$

(b) $\dfrac{y^4-2y^3}{2xy^3+x-xy^2}$

(c) $\dfrac{1}{2xy^3-x+xy}$

(d) $\dfrac{2xy^3-1+y}{y^2-x}$

(e) None of the above

25. Use implicit differentiation to find $y'(x)$ if $x^2 - 2xy + y^3 = 5$.

(a) $\dfrac{2y - 2x}{3y^2 - 2x}$

(b) 0

(c) $\dfrac{2}{3y}$

(d) $x - \dfrac{3y^2}{2}$

(e) None of the above

Answers will be posted on the course web page.