

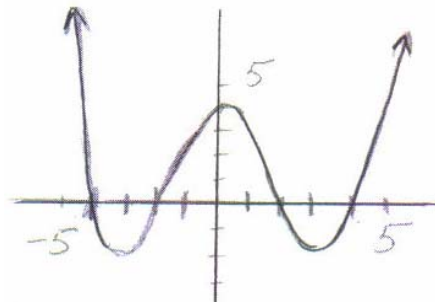
MA 153 Common Core Final Exam Practice Problems

1. The table below shows the per capita consumption of oranges in the United States in the early 1990's. Use your grapher to fit a regression line and then use the model to predict the per capita consumption of oranges in the US in the year 2000.

Year	Per capita consumption of oranges
1990	12.4 pounds
1991	8.5 pounds
1992	12.9 pounds
1993	14.2 pounds

- A. 18.8 pounds B. 19.2 pounds C. 20.3 pounds D. 20.7 pounds
2. Write an equation in standard form for the line which passes through $(-4, 13)$ and is perpendicular to $2x - 3y = 25$.
- A. $3x - 2y - 14 = 0$ B. $2x - 3y + 47 = 0$ C. $3x + 2y - 14 = 0$ D. $3x + 2y + 14 = 0$
3. For $f(x) = x^2 + x - 2$, find $f(a + 1)$.
- A. $a^2 + a - 1$ B. $a^2 + 3a$ C. $a^2 + a$ D. $a^2 + 2a + 2$
4. What is the range of the function g defined by $g(x) = |2x - 10| - 30$?
- A. $(-\infty, \infty)$ B. $(-\infty, -30)$ C. $(5, \infty) \cup (1/2, \infty)$ D. $[-30, \infty)$
5. Solve for x . Express your answer in interval notation. $8 - 2(3 - x) \leq 12$
- A. $[5, \infty)$ B. $(-\infty, 5)$ C. $(-\infty, 5]$ D. $(-\infty, 6)$
6. Let g be any function. Find an equation of the graph that will be obtained if the graph of $y = g(x)$ is translated 4 units to the left and 2 units down.
- A. $y = g(x - 4) - 2$ B. $y = g(x + 4) - 2$ C. $y = g(x - 2) - 4$ D. $y = g(x + 2) - 4$
7. Find the distance between the points $(3, -3)$ and $(7, -1)$.
- A. 2 B. 12 C. $12\sqrt{3}$ D. $2\sqrt{5}$
8. Using the graph below determine whether $f(-3)$ and $f(3)$ are positive or negative.

- A. $f(-3)$ and $f(3)$ are both positive.
 B. $f(-3)$ is positive and $f(3)$ is negative.
 C. $f(-3)$ is negative and $f(3)$ is positive.
 D. $f(-3)$ and $f(3)$ are both negative.
 E. Impossible to tell.



9. Two cars leave the same point at the same time traveling in opposite directions. One travels 8 miles per hour faster than the other. After 4 hours they are 368 miles apart. What is the speed of the faster car?

- A. 42 mph B. 50 mph C. 58 mph D. 66 mph

10. Helen has a rectangular garden which is 20 ft. long and 10 ft. wide. She wants to plant a flower border of uniform width inside the garden. She has enough flower seed to cover 29 ft.². How wide will the border be?

- A. $\frac{1}{2}$ ft. B. $\frac{3}{2}$ ft. C. 1 ft. D. 2 ft.

11. Solve for x. $\sqrt{x-8} = 5 - \sqrt{x+7}$

- A. The solution is less than 0. B. The solution is greater than 10.
C. There is no solution. D. The solution is between 8 and 10.

12. Complete the square to find the vertex of $f(x) = 5x^2 - 10x + 1$.

- A. (-1, 16) B. (-2, 41) C. (2, 1) D. (1, -4)

13. What is the domain of the function f defined by $f(x) = \frac{5}{\sqrt{20+11x-4x^2}}$?

- A. (-5/4, 4) B. $(-\infty, -5/4) \cup (4, \infty)$ C. $(-\infty, -4) \cup (1/2, \infty)$ D. (-4/3, 1/2)

14. Solve and write your answer in interval notation. $\frac{x+5}{2x-1} \leq 1$

- A. $[6, \frac{1}{2})$ B. $(6, \frac{1}{2})$ C. $(-\infty, 1/2) \cup [6, \infty)$ D. $(-\infty, \frac{1}{2}] \cup [6, \infty)$

15. Find $f(g(5))$ where f and g are the functions defined below.

$$f(x) = \begin{cases} x^2 + 12x & \text{if } x > 0 \\ 2x - 1 & \text{if } x \leq 0 \end{cases} \quad \text{and} \quad g(x) = \begin{cases} 7 - x & \text{if } x > -2 \\ 3 + x^3 & \text{if } x \leq -2 \end{cases}$$

- A. 28 B. -78 C. 3 D. Not defined

16. Find a formula for $f^{-1}(x)$ for $f(x) = x^3 + 5$

- A. $f^{-1}(x) = \frac{\sqrt{y-5}}{3}$ B. $f^{-1}(x) = \frac{1}{x^3+5}$ C. $f^{-1}(x) = \sqrt[3]{x-5}$ D. $f^{-1}(x) = \sqrt[3]{x-5}$

25. Find equations of all vertical asymptote(s) of $f(x) = \frac{3x+3}{x^3 - x^2 - x + 1}$

- A. $x = 1$ B. $y = 0$ C. $x = 1$ and $x = -1$ D. $x = -1$

26. At what interest rate would you need to invest 2000 dollars, compounded continuously ($A = Pe^{kt}$) so that it grows to 2309.77 dollars in 3 years?

- A. 4.8 % B. 1.9 % C. 5.1 % D. 3.3 %

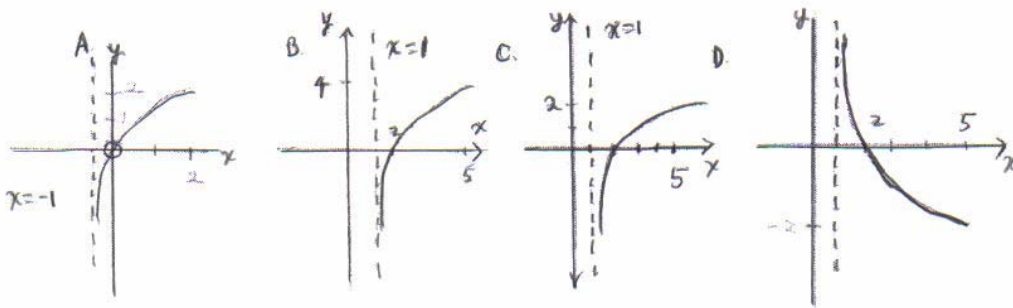
27. Convert to logarithmic form. $25^{3/2} = 125$

- A. $\log_{125}(25) = 3/2$ B. $\log_{25}(125) = 3/2$ C. $\log_{125}(3/2) = 25$ D. $\log_{25}(3/2) = 125$

28. Convert to exponential form. $\ln(v) = w$

- A. $10^w = v$ B. $v^2 = 10$ C. $e^w = v$ D. $w^e = v$

29. Which graph below could be the graph of the function f given by $f(x) = \log_2(x-1)$?



30. Solve for x . $\log_{32}(2) = x$

- A. -5 B. 1/5 C. 1/3 D. 5

31. Find the exact value of $10^{4\log(2)}$

- A. 8 B. 16 C. 10 D. 1.204

32. Which expression below is equivalent to $\log_7\left(\frac{x^3z}{\sqrt{y}}\right)$?

- A. $\frac{3\log_7(x)\log_7(z)}{(1/2)(\log_7(y))}$ B. $3\log_7(x)\log_7(z) - (1/2)\log_7(y)$
 C. $3\log_7(x) + \log_7(z) - (1/2)\log_7(y)$ D. $3\log_7(x)\log_7(z)(1/2)\log_7(y)$

33. Which expression below is equivalent to $2\log_r(a) - 5\log_r(b) + \log_r(c)$?

- A. $\log_r(2a - 5b^2 + c)$ B. $\log_r(a^2b^5 / c)$
 C. $\log_r(a^2c / b^5)$ D. $(\log_r(a^2)\log_r(c)) / \log_r(b^5)$

34. Compute $\log_6(96)$ to the nearest thousandth.

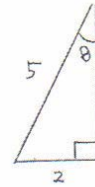
- A. 2.547 B. 0.3926 C. -2.547 D. 1.982

35. Simplify $\frac{5+2i}{9-8i}$. Express your answer in $a + bi$ form.

- A. $\frac{1}{5} + \frac{2}{5}i$ B. $\frac{1}{17} - \frac{2}{7}i$ C. $\frac{61}{5} - \frac{22}{5}i$ D. $\frac{61}{17} - \frac{2}{17}i$

36. Find $\cot \theta$ for the right triangle shown at the right.

- A. $\frac{2}{5}$ B. $\frac{5}{2}$ C. $\frac{\sqrt{21}}{2}$ D. $\frac{2}{\sqrt{21}}$



37. When Mack is sitting atop a tree and looking down at his pal Joey's feet, the angle of depression of Mack's line of sight is $46^\circ 30'$. If Joey is known to be standing 37 feet from the base of the tree, how tall is the tree to the nearest foot?

- A. 39 feet B. 42 feet C. 44 feet D. 46 feet

38. What is the angle of elevation of the sun when a 58 ft. mast of a boat casts a shadow of 16 ft.? Give your answer to the nearest tenth of a degree.

- A. 15.4° B. 72° C. 16° D. 74.6°

39. Solve $5x^2 + 19x - 4 = 0$

- A. $\left\{\frac{1}{5}, 4\right\}$ B. $\left\{\frac{1}{5}, -4\right\}$ C. $\left\{-\frac{1}{5}, 4\right\}$ D. $\left\{-\frac{1}{5}, -4\right\}$

40. Determine whether the function f is odd, even or neither.

$$f(x) = \frac{x^5}{x^4 - 5}$$

- A. odd B. even C. neither D. Impossible to tell

Answers:

1. C 2. C 3. B 4. D 5. C 6. B 7. D 8. D 9. B 10. A 11. D 12. D
 13. A 14. C 15. A 16. D 17. D 18. B 19. A 20. A 21. C 22. A 23. D 24. C
 25. A 26. A 27. B 28. C 29. C 30. B 31. B 32. C 33. C 34. A 35. A 36. C
 37. A 38. D 39. B 40. A