

## Final Exam for Math 190

**PLEASE ANSWER 36 questions from the following. A scientific calculator is allowed.**

<p><b>1. Factor:</b> <math>x^3 - 8</math>    a) <math>(x-2)^3</math>    b) <math>(x+2)(x^2 - 2x + 4)</math>    c) <math>(x+2)(x-2)(x+2)</math>  d) <math>(x-2)(x^2 + 2x + 4)</math>    e) none of these</p>
<p><b>2. Find the solution for the following:</b> <math>3x^2 - 2x + 7 = 0</math>  A) <math>\frac{1 \pm i\sqrt{22}}{3}</math>    B) <math>\frac{1 \pm \sqrt{22}}{3}</math>    C) <math>\frac{1 \pm 2i\sqrt{5}}{3}</math>    D) <math>\frac{1}{6} \pm \frac{\sqrt{22}}{3}</math>  E) <math>\frac{1}{6} \pm \frac{i\sqrt{5}}{3}</math>    F) none of these</p>
<p><b>3. Simplify:</b> <math>(3a^{-2}b^4)^2 (6a^2b^{-3})^{-1}</math>  A) <math>\frac{2b^{11}}{3a^6}</math>    B) <math>\frac{3b^{11}}{2a^2}</math>    C) <math>\frac{3a^2b^5}{2}</math>    D) <math>\frac{3b^{11}}{2a^6}</math>    E) none of these</p>
<p><b>4. Simplify:</b> <math>\frac{\left(x^{\frac{1}{2}}y^{\frac{-2}{3}}\right)^6}{\left(x^{\frac{-3}{4}}y^{\frac{5}{8}}\right)^{-8}}</math>    A) <math>\frac{y}{x^3}</math>    B) <math>\frac{x^9}{y}</math>    C) <math>\frac{x^3}{y}</math>    D) <math>x^9y</math>    E) none of these</p>
<p><b>5. Simplify:</b> <math>3ab\sqrt{a^3b^3} - 8b\sqrt{a^5b^3}</math>  A) <math>-5a^2b^2\sqrt{ab}</math>    B) <math>-5ab\sqrt{ab}</math>    C) <math>5a^2\sqrt{ab}</math>    D) <math>5ab\sqrt{ab}</math>    E) none of these</p>
<p><b>6. The expression</b> <math>3\sqrt{-18} + 5\sqrt{-12} =</math>  A) <math>9i\sqrt{2} + 10i\sqrt{3}</math>    B) <math>6i\sqrt{2} + 7i\sqrt{3}</math>    C) <math>19i\sqrt{5}</math>    D) <math>-90\sqrt{6}</math>    E) none of these</p>
<p><b>7.</b> <math>\frac{\left(y^{\frac{2}{3}}\right)^{\frac{3}{4}}}{\left(y^{\frac{1}{4}}\right)^{\frac{4}{3}}} =</math>    A) <math>y^{\frac{5}{6}}</math>    B) <math>\frac{1}{y^{\frac{1}{6}}}</math>    C) <math>-y^{\frac{5}{6}}</math>    D) <math>y^{\frac{1}{6}}</math>    E) None of these</p>
<p><b>8. Factor:</b> <math>2x^2y + 8xy^2 + 7x + 28y</math>  A) <math>(2x^2y^2 + 4)(1 + 7y)</math>    B) <math>(2xy + 7y)(x + 4)</math>    C) <math>(x + 4y)(2xy + 7)</math>  D) <math>(2xy + 4y)(x + 7)</math>    E) None of these</p>
<p><b>9. Factor:</b> <math>x^2(x-5)^3 + x^3(x-5)^2</math>  A) <math>x(2x+5)(x-5)^2</math>    B) <math>x^2(2x+5)(x-5)^2</math>    C) <math>x(2x-5)^2(x-5)^2</math>  D) <math>x^2(5x-5)(2x-5)</math>    E) <math>x^2(2x-5)(x-5)^2</math></p>

10.  $(2x^2 - x - 1)(x - 1) =$  A)  $x^3 + x^2 + x + 1$  B)  $2x^3 - x^2 + x - 1$  C)  $2x^3 - 3x^2 + 2x - 1$  D)  $x^3 - x^2 - 1$   
 E)  $2x^3 - 3x^2 + 1$  F) None of these

11.  $(a^2 + b)^2 - (a^2 - b)^2 =$  A)  $-4a^2b$  B) 0 C)  $4a^2b^2$  D)  $4a^2b$  E)  $b^4$  F) None of these

12. If  $f(x) = x^2 - 1$  and  $g(x) = 3x + 5$ , find  $(f \circ g)(2)$ .  
 a) 14 b) 120 c) 102 d) 60 e) none of the above

13. If  $f(x) = x^2 + x - 9$ , then  $f(a+2) =$  A)  $a^2 + 5a - 3$  B)  $a^2 + 2a - 5$  C)  $a^2 + a - 3$  D)  $a^2 + a - 7$   
 E) None of these

14.  $\frac{x^2 - 4}{x + 3} \cdot \frac{3x^2 + 9x}{x^2 - 2x} =$  A)  $x + 2$  B)  $x - 2$  C)  $3(x + 2)$  D)  $3(x - 2)$  E)  $\frac{(x + 2)(3x^2 + 9)}{x(x + 3)}$   
 F)  $\frac{(x - 2)(3x^2 + 9)}{(x + 3)}$  G)  $\frac{3(x^2 - 4)}{x - 2}$  H) none of these

15. Write the equation of the line that passes through P (-3, 10) and is perpendicular to  $4x + y = 6$ .  
 a)  $y = \frac{1}{4}x + \frac{43}{4}$  b)  $y = -\frac{1}{4}x + \frac{37}{4}$  c)  $y = 4x + 22$  d)  $y = 4x - 43$  E) none of these

Given the points A (6, 2) and B (8, -3),

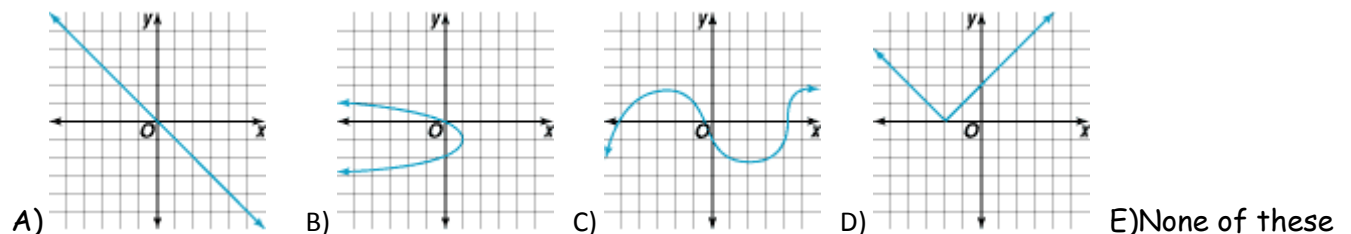
16. Find the distance between the points.

a)  $\sqrt{85}$  b)  $\sqrt{5}$  c)  $\sqrt{29}$  d)  $\sqrt{221}$  e) none of these

17. Find the midpoint of the segment AB, given the points above.

a)  $(7, -1/2)$  b)  $(-7, -1/2)$  c)  $(-7, 1/2)$  d)  $(7, 1/2)$   
 e) none of these

18. Choose the graph that is not a function.



Find the value of  $y$  in the system of equations  $\begin{cases} 2x - y = 16 \\ x + 3y = 1 \end{cases}$ .

- (a)  $-2$       (b)  $7$       (c)  $30$       (d)  $2$       (e)  $\frac{-17}{7}$

19.

20. Use the following quadratic function:  $f(x) = 2x^2 - 12x + 19$  and identify the vertex of the parabola given by the function,  $f$ .

- a)  $(-12, 19)$       b)  $(2, -12)$       c)  $(3, 1)$       d)  $(6, 19)$       e) none of these

21. Simplify:  $\frac{\tan x \cos x \csc x}{\cot x \sec x \sin x}$

- A)  $\tan^2 x \cos^2 x \sin^2 x$       B)  $1$       C)  $\csc^2 x$       D)  $0$       E)  $\tan^2 x$       F) none of these

22. If  $\sin \theta = -\frac{3}{7}$ , with  $\theta$  in the third quadrant, then  $\tan \theta =$

- a.  $-\frac{2\sqrt{10}}{7}$       b.  $\frac{2\sqrt{10}}{3}$       c.  $-\frac{7\sqrt{10}}{20}$       d.  $\frac{3\sqrt{10}}{20}$       e.  $-\frac{3}{4}$       f. none of these

23. Given  $f(x) = -3 - x^2$  simplify  $\frac{f(x+h) - f(x)}{h}$

24. Use long division to simplify the fraction:  $\frac{8x^3 - 4x^2 - 5x + 1}{x - 1}$

25. Rewrite as a completely reduced fraction:  $\frac{\frac{1}{x-2} + \frac{1}{x}}{4x-4}$   
 $\frac{1}{x^3 - 2x^2}$

26. Find the center of the circle whose equation is  $x^2 + y^2 = 11 + y - 2x$

27. Use Cramer's Rule to solve for  $x$ :  $\begin{cases} 2x + 2y + 2z = 3 \\ -x - 2z = -3 \\ -2x - y + 2z = -1 \end{cases}$

28. Simplify:  $\sqrt{50u^{11}v^{11}} + u^2v^3\sqrt{32u^7v^5}$

<p>29. Solve the following system of equations:</p>	$3y - x = 5$ $x^2 - y^2 = -3$
<p>30. The product of two negative numbers is 48. One number is two more than the other. Find the numbers.</p>	
<p>31. Solve the equation for x: <math>2\sqrt{x-1} = 3 + \sqrt{x-4}</math></p>	
<p>32. Solve for x: <math>3x^2 - 2x - 6 = 0</math></p>	
<p>33. Solve for x: <math>9x^3 + 18x^2 - 4x - 8 = 0</math></p>	
<p>34. In triangle ABC, angle C measures 80 degrees, and angle B measures 30 degrees, and the length of side BC is 6. Find the length of side AC, correct to 3 decimal places.</p>	
<p>35. In triangle ABC, angle A measures 20 degrees, side AC measures 10 centimeters, and the length of side AB is 12 centimeters. Find the length of side BC, correct to three decimal places.</p>	
<p>36. Solve for x: <math>\frac{1}{x^2} + \frac{1}{x} = \frac{6}{x+2}</math></p>	
<p>37. Rewrite as a completely reduced fraction: <math>\frac{2x+1}{x^2+x} + \frac{x}{x+1}</math></p>	
<p>38. Find four consecutive positive integers such that the product of the first and fourth is four less than twice the first multiplied by the fourth.</p>	
<p>39. <math>\sqrt[3]{3b^3} - 3b \sqrt[3]{24} + 2 \sqrt[3]{81b^3}</math></p>	

**Math 190 Final Exam ANSWER SHEET**

NAME \_\_\_\_\_

**OMIT 3 QUESTIONS**

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