Review for MA 11100 Final Exam

Date _______________________       Time ____________________    Room _______________

Student ID Number ____________________________  (This will be needed on the scantron form for the exam.)

There are 50 problems on the Final Exam. All problems are in multiple-choice format with 5 possible answers a, b, c, d, and e. There is also more room to work the problems. No partial credit will be given.

- No formula sheets, notes, books or any other external resources may be used on the final exam.
- You must bring No. 2 pencils and a calculator to the final exam with you.
- No Cell phones or computers allowed during the exam.

This review has mixed format. The following problems are provided as a review and represent many of the types of problems that you may expect on the final exam.

For problems #1-6. Shown is the graph of function \( y = f(x) \).

![Graph of function](image)

1. (See the graph.) What is the Domain of \( f \)?
   a) \((-9, 7]\)   b) \([-9, 7)\)   c) \((-8, 8]\)   d) \([-8,8)\)   e) \((7, -9]\)

2. (See the graph.) What is the Range of \( f \)?
   a) \((-9, 7]\)   b) \([-9, 7)\)   c) \((-8, 8]\)   d) \([-8,8)\)   e) \((8, -8]\)

3. (See the graph.) What is the \( x \)-intercept?
   a) \((0, -3)\)   b) \((0, -4)\)   c) \((-3, 0)\)   d) \((-4, 0)\)   e) \((3, 0)\)
4. (See the graph.) What is the $y$-intercept?
   a) $(0, -3)$  
   b) $(0, -4)$  
   c) $(-3, 0)$  
   d) $(-4, 0)$  
   e) $(0, 4)$

5. (See the graph.) Find the value of $f(0)$.
   a) $-9$  
   b) $-3$  
   c) $0$  
   d) $-4$  
   e) $-8$

6. (See the graph.) Find the value of $x$ for which $f(x) = 0$.
   a) $-9$  
   b) $-3$  
   c) $0$  
   d) $-4$  
   e) $3$

7. Which of the graphs below are functions? (On the Final Exam, this will be in multiple choice format.)

8. Graph the inequality: $\ -3 \leq x < 9$

   a)  
   b)  
   c)  
   d)  
   e)  

3/16
9. Solve the inequality: \(9 - 5(x + 7) + 2x < 4 - 2(8 - 5x)\)
   a) \(x < -14\)  
   b) \(x < -\frac{14}{13}\)  
   c) \(x > -\frac{14}{13}\)  
   d) \(x < -\frac{3}{4}\)  
   e) \(x > -\frac{3}{4}\)

10. Find the equation of the line from its graph.

   a) \(y = \frac{3}{2}x + 3\)
   b) \(y = -\frac{2}{3}x + 3\)
   c) \(y = -\frac{3}{2}x + 3\)
   d) \(y = \frac{2}{3}x + 3\)
   e) \(y = -\frac{3}{2}x + 2\)

11. A company’s revenue in 2005 was $17 million. Each year the revenue increases by $1.2 million. Find a linear model for this situation and predict the revenue in 2014. Let \(x = 0\) represent the year 2005.

   a) \(R = 17x + 1.2\)  
   \(\text{ $154.2 Million}\)
   b) \(R = 1.2x - 17\)  
   \(\text{ $6.2 Million}\)
   c) \(R = 1.2x + 17\)  
   \(\text{ $6.2 Million}\)
   d) \(R = \frac{17}{1.2}x\)  
   \(\text{ $127.5 Million}\)
   e) \(R = 1.2x + 17\)  
   \(\text{ $27.8 Million}\)

12. Find the slope of the line through the points \((2, -7)\) and \((-4, 13)\).

   a) \(-\frac{1}{3}\)
   b) \(-3\)
   c) \(-\frac{3}{10}\)
   d) \(\frac{10}{3}\)
   e) \(-\frac{10}{3}\)

13. Find the equation of the line through the point \((-2, 5)\) with slope \(m = 3\).

   a) \(y = 3x - 1\)
   b) \(y = 3x + 11\)
   c) \(y = 3x + 5\)
   d) \(y = -2x + 5\)
   e) \(y = 3x - 11\)

14. Find the equation of the line through the point \((-8, 7)\) that is perpendicular to the line \(4x - 3y = 11\).

   a) \(y = -\frac{3}{4}x + 13\)
   b) \(y = -\frac{3}{4}x + 7\)
   c) \(y = \frac{3}{4}x + 1\)
   d) \(y = \frac{4}{3}x - \frac{11}{3}\)
   e) \(y = -\frac{3}{4}x + 1\)
15. Given the graph of $y = mx + b$, which of the following is true?

- a) $m < 0$ and $b > 0$
- b) $m > 0$ and $b > 0$
- c) $m < 0$ and $b < 0$
- d) $m > 0$ and $b < 0$
- e) $m = 0$ and $b < 0$

16. Factor completely: $12x^3 - 16x^2 + 9x - 12$

- a) $4x^2 (3x - 4)^2$
- b) $x(12x^2 - 16x + 9) - 12$
- c) $4x^2 (3x - 4)$
- d) $(4x^2 + 3)(3x - 4)$
- e) $(4x^2 + 3)(3x - 4)^2$

17. Which of the following is a factor of $8x^2 - 2x - 3$?

- a) $(2x - 1)$
- b) $(4x - 3)$
- c) $(2x + 3)$
- d) $(4x + 3)$
- e) $(8x - 3)$

18. Factor completely: $-16x^2 + 52x - 40$

- a) $-4(4x - 5)(x - 2)$
- b) $(x - 2)(4x - 5)$
- c) $-4(x - 5)(4x - 2)$
- d) $(4x - 5)(-4x + 8)$
- e) Prime

19. Factor completely: $25x^2 - 36x^4$

- a) $x^2(25 - 36x^2)$
- b) $(5x^2 + 6x)(5 - 6x^3)$
- c) $x^2(5 - 6x)(5 + 6x)$
- d) $x^2(6x + 5)(6x - 5)$
- e) Prime
20. Solve for $x$: $7x(3x + 5) = 0$

a) $x = 0 \text{ or } x = -\frac{3}{5}$

b) $x = 0 \text{ or } x = -\frac{5}{3}$

c) $x = 0 \text{ or } x = \frac{5}{3}$

d) $x = -7 \text{ or } x = -\frac{5}{3}$

e) $x = -\frac{5}{3}$ only

21. Which is the graph of $y = |x + 6| + 3$?

a) ![Graph 1](image)

b) ![Graph 2](image)

c) ![Graph 3](image)

d) ![Graph 4](image)

e) ![Graph 5](image)

22. Solve the system for $x$.

$2x + 3y = 7$

$-x + 4y = 24$

a) $x = 5$

b) $x = 11$

c) $x = 31$

d) $x = -4$

e) $x = 1$

**For problems #23 & 24.** Solve the system of equations.

$\begin{cases}
4x - 3y = 89 \\
5x + 4y = -5
\end{cases}$

23. For the system above, the value of $x$ is: ________________

24. For the system above, the value of $y$ is: ________________
25. The graph of $y = f(x)$ is shown. Estimate $a$ for $f(a) = 0$.

![Graph of $y = f(x)$]

a) $-1$ only  

b) $0$ only  

c) $1$ only  

d) $-3$ only  

e) $3$ only  

f) $-1$ or $3$  

g) $0$ or $-3$

26. The graph of $y = g(x)$ is shown. Estimate $a$ for $g(a) = 0$.

![Graph of $y = g(x)$]

a) $-5$ only  

b) $-2$ only  

c) $1$ only  

d) $-5$ or $1$  

e) $0$ only  

f) $2.5$ only  

g) $0$ or $2.5$

27. Find a polynomial, with integer coefficients, having the following zeros: $x = -5$ and $x = \frac{8}{3}$.

a) $f(x) = 8x^2 + 37x - 15$  

b) $f(x) = 3x^2 - 7x - 40$  

c) $f(x) = 3x^2 + 7x - 40$  

d) $f(x) = 8x^2 - 43x + 15$  

e) $f(x) = 3x^2 - 23x + 40$

28. Find a polynomial with integer coefficients having the following $x$-intercepts on its graph: $(-4,0)$ and $(5,0)$.

a) $f(x) = -4x^2 + 20x$  

b) $f(x) = x^2 - x - 20$  

c) $f(x) = x^2 + x - 20$  

d) $f(x) = x^2 - 20$  

e) $f(x) = -20x^2$
29. The height of a rock that is thrown from a 50 meter cliff is given by $h(t) = -4.9t^2 + 9t + 50$, where $t$ is time in seconds after being thrown. At what time will the rock return to a height of 50 meters?

a) 0.92 sec  b) 1.75 sec  c) 4.24 sec  d) 1.84 sec  e) never

30. The area of a rectangle lot is 32.5 square meters. The length is three more than four times the width. Find the length.

a) 11.5 meters  b) 3.25 meters  c) 2.5 meters  d) 13 meters  e) 13.6 meters

31. Solve for $x$: $9x^2 = 64x$

a) $x = \frac{64}{9}$  b) $x = \pm \frac{8}{3}$  c) $x = 0$ or $x = \frac{64}{9}$  d) $x = 0$ or $x = \frac{9}{64}$  e) $x = \frac{9}{64}$

32. Solve for $x$: $9x^2 = 15$

a) $x = \frac{15}{9}$  b) $x = 0$ or $x = \frac{5}{3}$  c) $x = -3$ or $x = \frac{5}{3}$  d) $x = \frac{\sqrt{15}}{3}$  e) $x = \pm \frac{\sqrt{15}}{3}$

33. Solve for $x$: $3x^2 - 7x + 2 = 0$

a) $x = 1$ or $x = \frac{2}{3}$  b) $x = \frac{1}{3}$ or $x = 2$  c) $x = 0$ or $x = \frac{7}{3}$  d) $x = 1$ or $x = 2$

e) $x = 2$ only

34. Solve for $x$: $x^2 + 12x - 7 = 0$.

a) $x = 6 \pm \sqrt{83}$  b) $x = -7 \pm \sqrt{22}$  c) $x = -6 \pm \sqrt{43}$  d) $x = 6 \pm \sqrt{43}$

e) $x = 6 \pm \sqrt{29}$

35. Solve for $x$: $3x^2 + 5x = 7$

a) $x = \frac{-5 \pm \sqrt{109}}{6}$  b) $x = \frac{5 \pm \sqrt{109}}{6}$  c) $x = \frac{-5 \pm \sqrt{109}}{2}$  d) $x = \frac{-5}{6} \pm \sqrt{109}$

e) No real number solution
36. Solve for $x$: $(2x - 7)^2 = 6$

a) $x = 7 \pm \frac{\sqrt{6}}{2}$  

b) $x = \frac{7 \pm \sqrt{6}}{2}$  

c) $x = \frac{7}{2} \pm \sqrt{6}$  

d) $x = -\frac{7 \pm \sqrt{6}}{2}$  

e) $x = \frac{\sqrt{6} + 7}{2}$

37. Find the vertex and $y$-intercept of the parabola $f(x) = (x+5)^2 - 8$.

a) vertex: $(-5, -8)$  

b) vertex: $(5, -8)$  

c) vertex: $(-5, -8)$  

y-int.: $(17, 0)$  

d) vertex: $(-5, 8)$  

e) vertex: $(-5, -8)$  

y-int.: $(-2.17, 0)$  

y-int.: $(0, 17)$  

38. Given $f(x) = 3x^2 - 11x - 20$, find the $x$-intercepts.

a) $(-5, 0), \left(\frac{4}{3}, 0\right)$  

b) $(5, 0), \left(-\frac{4}{3}, 0\right)$  

c) $(5, 0), \left(-\frac{3}{4}, 0\right)$

d) $(0, 5), \left(0, -\frac{3}{4}\right)$  

e) $(0, 5), (-20, 0)$

39. Find the vertex form of the parabola shown below.

![Graph of a parabola]

a) $y = (x+1)^2 + 2$  

b) $y = (x-1)^2 - 2$  

c) $y = (x-1)^2 + 2$  

d) $y = (x+1)^2 - 2$  

e) $y = (x-2)^2 + 1$
40. For the function of the form \( y = f(x) = a(x - h)^2 + k \) shown, determine the signs of \( a, h, \) and \( k \).

![Graph of a parabola]

a) \( a, h, \) and \( k \) are all negative  

b) \( a \) and \( h \) are negative, \( k \) is positive  
c) \( a \) and \( k \) are negative, \( h \) is positive  
d) \( h \) and \( k \) are negative, \( a \) is positive  
e) \( a \) is negative, \( h \) and \( k \) are positive  
f) \( h \) is negative, \( a \) and \( k \) are positive  
g) \( k \) is negative, \( a \) and \( h \) are positive  
h) \( a, h, \) and \( k \) are all positive

41. For the function of the form \( y = f(x) = a(x - h)^2 + k \) shown, determine the signs of \( a, h, \) and \( k \).

![Graph of a parabola]

a) \( a, h, \) and \( k \) are all negative  

b) \( a \) and \( h \) are negative, \( k \) is positive  
c) \( a \) and \( k \) are negative, \( h \) is positive  
d) \( h \) and \( k \) are negative, \( a \) is positive  
e) \( a \) is negative, \( h \) and \( k \) are positive  
f) \( h \) is negative, \( a \) and \( k \) are positive  
g) \( k \) is negative, \( a \) and \( h \) are positive  
h) \( a, h, \) and \( k \) are all positive

42. The height of a rock that is thrown from a 300 foot cliff is given by \( h(t) = -16t^2 + 48t + 300 \) where \( t \) is time in seconds. How long will it take for the rock to hit the ground? Round to the nearest tenth of a second.

a) 6.0 seconds  
b) 52.6 seconds  
c) 3.1 seconds  
d) 6.1 seconds  
e) 300 seconds

43. Rewrite with positive exponents: \( \frac{x^{-5}x^{28}}{x^{-10}} \)

a) \( x^{-14} \)  
b) \( x^{33} \)  
c) \( x^{23} \)  
d) \( x^{14} \)  
e) \( x^{13} \)
44. Which of the following is equivalent to \(-x^7\)?
   a) \(-\sqrt[7]{x^9}\)   b) \(-\sqrt[9]{x^7}\)   c) \(\frac{1}{\sqrt[9]{x^7}}\)   d) \(\frac{1}{\sqrt[7]{x^9}}\)   e) \(-\frac{1}{\sqrt[9]{x^7}}\)

45. Which of the following is equivalent to \(x^{-\frac{2}{5}}\)?
   a) \(\frac{3}{\sqrt[5]{x^2}}\)   b) \(\frac{1}{\sqrt[5]{x^3}}\)   c) \(\frac{1}{\sqrt[2]{x^2}}\)   d) \(-\sqrt[2]{x^2}\)   e) \(-\sqrt{x^3}\)

46. Simplify: \(\frac{10a^{10}b^{-10}c^5}{-15a^{-5}b^{20}c^{-5}}\)

47. Simplify: \(\left(\frac{64x^{18}y^4}{125x^{-3}y}\right)^{\frac{1}{3}}\)

48. Simplify \((16x^{10})^{\frac{3}{2}}\)
   a) \(8x^{15}\)   b) \(24x^{15}\)   c) \(64x^{15}\)   d) \(64x^{7/2}\)   e) \(24x^8\)

49. Simplify: \(\frac{x^{\frac{1}{4}}x^{\frac{5}{4}}}{x^3}\)
   a) \(x^7\)   b) \(\frac{1}{x^{10}}\)   c) \(\frac{1}{x^4}\)   d) \(\frac{1}{x^4}\)   e) \(\frac{1}{x^{3/2}}\)

50. Simplify: \(\sqrt[5]{-32x^{15}y^{30}}\)
   a) \(-2x^3y^6\)   b) \(-2x^{10}y^{25}\)   c) \(-2x^{10}y^6\)   d) \(-6.4x^3y^6\)   e) not a real number

51. Simplify: \(\sqrt[3]{64x^9y^{21}}\)
   a) \(21.3333x^3y^7\)   b) \(4x^6y^7\)   c) \(4x^3y^7\)   d) \(8x^3y^7\)   e) \(4x^6y^{18}\)
52. Simplify. Assume all variables represent positive numbers.

\[ \sqrt[3]{\frac{x^{36}}{36y^{16}}} \]

a) \( \frac{x^6}{6y^4} \)  

b) \( \frac{x^{18}}{18y^8} \)  

c) \( \frac{x^{18}}{6y^8} \)  

d) \( \frac{x^{10}}{6} \)  

e) \( \frac{x^6}{6} \)

53. Use rational exponents to help write the radical expression in a simpler form. Assume all variables represent positive numbers.

\[ \sqrt[12]{x^3} \]

a) \( x^2 \)  

b) \( \sqrt[9]{x} \)  

c) \( \sqrt[4]{x} \)  

d) \( x^4 \)  

e) \( \sqrt{x^9} \)

54. Use rational exponents to help write the radical expression in a simpler form. Assume all variables represent positive numbers.

\[ \sqrt[3]{x^2} \cdot \sqrt[4]{x} \]

a) \( \frac{12}{11} \sqrt[3]{x^3} \)  

b) \( \frac{12}{11} \sqrt[3]{x^3} \)  

c) \( \frac{12}{11} \sqrt[3]{x^3} \)  

d) \( \frac{7}{11} \sqrt[3]{x^3} \)  

e) \( \frac{12}{11} \sqrt[3]{x^3} \)

55. Subtract and simplify.

\[(5x^4 + 10x^3 - 7x + 8) - (x^4 - 2x^3 + x^2 - 3x - 12)\]

a) \( 4x^6 + 12x^3 - 7x^4 + x^2 - 4x + 20 \)  

b) \( 4x^4 + 8x^3 + x^2 - 10x - 4 \)  

c) \( 4x^4 + 12x^3 - x^2 - 4x + 20 \)  

d) \( 6x^4 + 8x^3 + x^2 - 10x - 4 \)  

e) \( 4x^4 + 12x^3 + x^2 - 4x + 20 \)
56. Determine the domain of \( f(x) = \frac{4x-20}{x^2-25} \)

a) all real numbers except -5 and 5  
b) all real numbers except 5  
c) all real numbers except -5  
d) all real numbers except 0  
e) all real numbers

57. Determine the domain of \( f(x) = \frac{4x}{x^2-36} \)

a) all real numbers  
b) all real numbers except -6 and 6  
c) all real numbers between -6 and 6  
d) all real numbers except 0  
e) all real numbers

58. Simplify: \( \frac{18-2x}{x^3-81} \)

a) \( \frac{-2}{x+9} \)  
b) \( \frac{2}{x+9} \)  
c) \( \frac{2}{x-9} \)  
d) \( \frac{2-x}{x-9} \)  
e) \( \frac{-2}{x-9} \)

59. Multiply and simplify: \( \frac{x^2-9}{5x-35} \cdot \frac{x-7}{x-3} \)

a) \( \frac{x}{5} \)  
b) \( \frac{x^2-3}{5x-7} \)  
c) \( \frac{x-3}{-2} \)  
d) \( \frac{x+3}{5} \)  
e) \( \frac{x-3}{5} \)

60. Divide and simplify: \( \frac{x-4}{2x} \div \frac{x^2-16}{3x^2} \)

a) \( \frac{3x}{2(x-4)} \)  
b) \( \frac{2(x+4)}{3x} \)  
c) \( \frac{(x-4)(x^2-16)}{6x^3} \)  
d) \( \frac{3x}{2(x+4)} \)  
e) \( \frac{3x}{x+4} \)
61. Subtract and simplify: \( \frac{7x-9}{x^2+x-6} - \frac{1}{x-2} \)
   
a) \( \frac{6(x-1)}{(x-2)(x+3)} \)  
b) \( \frac{6(x+1)}{(x-2)(x-3)} \)  
c) \( \frac{6}{x+3} \)  
d) \( \frac{6}{x-3} \)  
e) \( \frac{7x-10}{x^2-4} \)

62. Solve for \( x \): \( \frac{x}{x+4} - 6 = 0 \)
   
a) \( x = -6 \)  
b) \( x = -\frac{24}{5} \)  
c) \( x = \frac{4}{11} \)  
d) \( x = 6 \)  
e) \( x = 3 \)

63. Solve for \( x \): \( \frac{x}{x-5} = \frac{7}{x-5} + \frac{1}{3} \)
   
a) \( x = -8 \)  
b) \( x = -13 \)  
c) \( x = 4 \)  
d) \( x = 8 \)  
e) \( x = -4 \)

64. Solve for \( x \): \( \frac{1}{x+5} + \frac{7}{22x+20} = \frac{x+13}{22x+20} \)
   
a) \( x = -1 \) or \( x = 10 \)  
b) \( x = 1 \) or \( x = 10 \)  
c) \( x = -1 \) or \( x = -10 \)  
d) \( x = 1 \) or \( x = -10 \)  
e) \( x = 10 \) only

65. Assume that \( x \geq 0, y \geq 0 \). Simplify: \( \sqrt{80a^4b^9c^{16}} \)
   
a) \( 8\sqrt{10a^4b^9c^{16}} \)  
b) \( 4a^2b^3c^4\sqrt{5} \)  
c) \( 4a^2b^4c^8\sqrt{5abc} \)  
d) \( 2a^2b^4c^8\sqrt{20b} \)  
e) \( 4a^2b^4c^8\sqrt{5b} \)

66. Solve for \( x \) and then determine which interval contains the correct solution(s): \( \sqrt{3x-7} = 36 \)
   
a) \( 3 < x < 7 \)  
b) \( 500 < x < 700 \)  
c) \( 0 < x < 4 \)  
d) \( 300 < x < 500 \)  
e) \( -4 < x < 0 \)

67. Solve for \( x \): \( \sqrt{x+10} + 9 = -1 \)
   
a) \( x = -740 \)  
b) \( x = 990 \)  
c) \( x = -1010 \)  
d) \( x = -522 \)  
e) \( x = -990 \)
68. Graph the function and determine the intercepts for \( y = \sqrt{x - 9} \).

   a) \( x\)-intercept: None  
      \( y\)-intercept: (0,9)

   b) \( x\)-intercept: (9,0)  
      \( y\)-intercept: None

   c) \( x\)-intercept: (9,0)  
      \( y\)-intercept: (0,3)

   d) \( x\)-intercept: (9,0)  
      \( y\)-intercept: (0,-3)

   e) \( x\)-intercept: (-9,0)  
      \( y\)-intercept: None

69. What is the domain of \( y = f(x) = \sqrt{x - 9} \)?

   a) \((-9, \infty)\)  
   b) \([-9, \infty)\)  
   c) \((9, \infty)\)  
   d) \([9, \infty)\)  
   e) \([0, \infty)\)

   f) \((-\infty, -9)\)  
   g) \((-\infty, -9]\)  
   h) \((-\infty, 9)\)  
   i) \((-\infty, 9]\)  
   j) \((-\infty, \infty)\)

70. Use the Distance Formula \( \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \) to find the distance between the points \((-3,2)\) and \((1,-6)\).

   a) 12  
   b) \(4\sqrt{3}\)  
   c) \(2\sqrt{5}\)  
   d) \(4\sqrt{5}\)  
   e) \(16\sqrt{5}\)