

MAT 160 REVIEW PROBLEMS FOR FINAL EXAM FALL 2009

The correct answers are check marked right after them.

1. Identify the one which is not an equation or not an inequality:
 - a. $3x^2 + 5x$ ✓
 - b. $6x + 1 = -x^2 - 8$
 - c. $7x - 21 \leq 0$
 - d. All of the above
2. Solve the equation : $2x - 5 = x$
 - a. 10
 - b. 5 ✓
 - c. -11
 - d. 8
3. The universe U and the solution set for the equation: $\frac{2}{x-1} + 3 = 2$
 - a. U: $x \neq 1$ Solution set : $\{-1\}$ ✓
 - b. U: $x \neq 1$ Solution set : $\{1\}$
 - c. U: $x \neq -1$ Solution set : $\{-1\}$
 - d. U: $x \neq -1$ Solution set : $\{2\}$
4. The index and radicand of the radical: $\sqrt[3]{7}$ is
 - a. index = 7 and radicand = 3
 - b. index = 3 and radicand = 7 ✓
5. The index of the radical $\sqrt[3]{\sqrt{21}}$
 - a. 2
 - b. 6 ✓
 - c. 3
 - d. 21
6. Simplify : $\sqrt[8]{\sqrt{2^{16}}}$
 - a. 4
 - b. 16
 - c. 2 ✓
 - d. 2^{16}
7. Simplify: $\frac{5^{\left(\frac{3}{4}\right)}}{5^{\left(-\frac{1}{4}\right)}}$:
 - a. 5 ✓
 - b. 25
 - c. 1
 - d. $5^{\frac{1}{2}}$
8. Simplify $\sqrt[3]{x^7}$:
 - a. $x^2\sqrt[3]{x}$ ✓
 - b. $x\sqrt[3]{x}$
 - c. $x\sqrt[3]{x^4}$
 - d. x^{10}
9. Simplify : $(\sqrt{x} - \sqrt{y})(\sqrt{x} + \sqrt{y}) =$
 - a. $x - y$ ✓
 - b. $x + y$
 - c. $2x - 2y$
 - d. x
10. Rationalize the denominator : $\frac{x}{\sqrt{5}}$

- a. $\frac{x}{5}$ b. $\frac{x\sqrt{5}}{5}$ ✓ c. x d. $\frac{x}{25}$
11. Rationalize the denominator : $\frac{1}{\sqrt{11}-\sqrt{5}}$
- a. $\frac{\sqrt{11}+\sqrt{5}}{6}$ ✓ b. $\frac{1}{\sqrt{6}}$ c. $\frac{\sqrt{16}}{6}$ d. $\frac{\sqrt{11}-\sqrt{5}}{6}$
12. Which of the following is true for the quadratic equation : $3x^2-8x+4=0$,
- a. $a=3, b=-8, c=4$ ✓ b. $a=2, b=8, c=-4$ c. $a=3, b=8, c=4$
d. $a=3, b=1, c=0$
13. Solve by extracting roots : $x^2=25$
- a. $\{-5, 5\}$ ✓ b. $\{4\}$ c. $\{-4\}$ d. $\{-4, 4, 0\}$
14. Solve by extracting roots : $(x+1)^2=49$
- a. $\{-8, 6\}$ ✓ b. $\{-8\}$ c. $\{6\}$ d. $\{-8, 6, 0\}$
15. Solve by factoring : $x^2-6x+8=0$
- a. $\{2, -4\}$ b. $\{-2, 4\}$ c. $\{2, 4\}$ ✓ d. $\{-2, -4\}$
16. Write the missing number to get a perfect square on the quadratic expression: $x^2-6x+ _$ is
- a. 3 b. -3 c. 9 ✓ d. -6
17. Solve by completing the square method : $x^2+6x+2=0$
- a. $\{3+\sqrt{7}, 3-\sqrt{7}\}$ b. $\{-3+\sqrt{2}, -3-\sqrt{2}\}$ c. $\{-3+\sqrt{7}, -3-\sqrt{7}\}$
✓ d. $\{-3, 3+\sqrt{7}\}$
18. Using the sign of the discriminant : b^2-4ac , determine the number and type of roots: $x^2-2x+1=0$:
- a. two distinct real roots b. no real roots c. one real root of multiplicity 2 ✓
19. The number and type of roots for : $x^2-8x+15=0$:
- a. one real root of multiplicity 2 b. two distinct real roots ✓ c. no real roots
20. Solve for z : from $\sqrt{2z-1}=z$
- a. $z=\frac{1}{2}$ b. $z=1$ ✓ c. $z=0$ d. $z=\frac{1}{8}$

21. Solve the inequality: $2x - 3 \leq 0$:
a. $[\frac{3}{2}, \infty)$ **b.** $(-\infty, \infty)$ **c.** $(-\infty, \frac{3}{2}]$ ✓ **d.** $(2, 3)$
22. The solution set of the inequality : $-4 \leq 3x + 2 < 9$:
a. $(\frac{-4}{3}, 3)$ **b.** $[-2, \frac{7}{3})$ ✓ **c.** $(-2, 7)$ **d.** $\{\}$
23. Solve : $(x + 3)(x - 2) < 0$:
a. $(-\infty, -3) \cup (2, \infty)$ **b.** $(-3, 2)$ ✓ **c.** $\mathbb{R} \setminus \{2\}$ **d.** $\mathbb{R} \setminus \{-3, 2\}$
24. Solve the absolute value equation: $|x + 3| = 3$: *Ans* : $x = 0, -6$
25. Solve the following absolute value inequalities: $|x| \leq 6$: *Ans* : $-6 \leq x \leq 6$
or $[-6, 6]$
26. Solve absolute value inequality: $|x - 1| \geq 4$
a. $5 \geq x \geq -1$ **b.** $x \leq 5$ or $x \geq -3$ **c.** $x \geq 5$ or $x \leq -3$ ✓
d. $\{\}$
27. Determine the equation of the line with slope $m = 3$, y-intercept : $b = 2$
Ans: $y = 3x + 2$
28. Find the equation of the line that passes through $(1, 2)$ and has slope $m = -2$
Ans: $y = -2x + 4$
29. Determine the slope m and Y-intercept b for the $l : y = -5x + 7$:
 $m = -5$; $b = 7$
30. In a certain university 40% of students who get admission actually enrolled. How many students will be enrolled if 8000 students get admission.
a. 3000 **b.** 3500 **c.** 3200 ✓ **d.** 1200
31. Determine the equation of the line l_2 which passes through the point $(2, 1)$ and parallel to the line $l_1 : y = 2x - 1$:
a. $y = 3x + 2$ **b.** $y = 2x - 3$ ✓ **c.** $y = 3x - 3$ **d.** $y = 3x$
32. Which set of ordered pairs is a function ?
a. $\{(1, 1), (2, 5), (2, 4), (7, 8), (12, 10), (9, 9)\}$
b. $\{(2, 1), (13, 5), (12, 11), (13, 14), (9, 9), (21, 20)\}$
c. $\{(-3, -4), (3, 5), (12, 11), (21, 14), (-9, 9), (x, z)\}$ ✓
d. $\{(-3, -4), (-3, 5), (12, 11), (21, 14), (-9, 9), (x, z)\}$
33. For the function: $f(x) = 3x^2 - 2x + 7$, what is $f(2) - 2$
a. 0 **b.** 17 **c.** 15 **d.** 13 ✓

34. The domain of the function : $f(x) = \frac{x}{x^2-36}$ is : $x \neq \pm 6$
 Answer problems 38, 39, 40 using the functions : $f(x) = 3x^2 - 7$, $g(x) = x + 1$
35. $(f + g)(x) = 3x^2 + x - 6$
36. $(f + g)(0) = -6$
37. For the function $f(x) = 3x + 1$ which one is not true
- the point $(0, 1)$ is on the graph of f
 - the graph of f is a straight line
 - the y -intercept for the graph is at $(0, 1)$
 - the slope of the line is 3
 - none of the above ✓
38. Which of the following is not true about the quadratic function :
 $f(x) = 2x^2 - 4x + 1$
- the graph is a parabola that opens down wards: \cap ✓
 - the vertex of the parabola is at : $(1, -1)$
 - the axis of symmetry of the parabola is : $x = 1$
 - the range of the function is $[-1, \infty)$
- ✂ : Answer questions 3 through 8 based on the following:
- Let $\underset{\substack{\uparrow \\ \text{unit price}}}{p} = -0.02 \underset{\substack{\uparrow \\ \text{amount of unit needed}}}{x} + 1000$ be the demand equation of a product in a certain company.
- The revenue function then is given by:
- $$R(x) = xp = x(-0.02x + 1000) = -0.02x^2 + 1000x$$
39. What is the price of a unit of product when the number of units demanded is 1000
- a) \$900 b) \$980 ✓ c) \$970 d) \$1000
40. The unit price of the product when the needed amount is zero is:
- a) \$800 b) \$900 c) \$1000 ✓ d) \$1500
41. The number of units of the product x that is needed to make the unit price p zero is :
- a) $x = 0$ b) $x = 50000$ ✓ c) $x = 10000$ d) $x = 20000$

- a) 1 b) -1 ✓ c) 2 d) -2 e) none
50. The solution set for the equation : $(2^x)^2 - 4(2^x) + 4 = 0$
- a) $\{-2\}$ b) $\{2\}$ c) $\{1\}$ ✓ d) $\{-1\}$
51. Evaluate : $\log_2\left(\frac{1}{4}\right)$
- a) 2 b) -2 ✓ c) 1 d) -1
52. Evaluate : $\log_3 3$
- a) 0 b) 1 ✓ c) -1 d) -1
53. Solve for the variable x : $\log_3(6x) = 2$
- a) $x = \frac{2}{3}$ b) $x = \frac{3}{2}$ ✓ c) $x = \frac{1}{3}$ d) $x = 3$
54. Find the solution set of : $\ln\left(\frac{x}{2}\right) = 1$
- a) $\left\{\frac{e}{2}\right\}$ b) $\left\{\frac{1}{2}\right\}$ c) $\{2e\}$ ✓ d) $\left\{\frac{2}{e}\right\}$
55. Expand completely : $\log_3\left(\frac{x^3 y^{\frac{1}{5}}}{z^5}\right)$
- a) $\log_3 x^3 + \log_3 y^{\frac{1}{5}} - \log_3 z^5$ b) $3 \log_3 x + \frac{1}{5} \log_3 y - 5 \log_3 z$ ✓
- c) $\log_3\left(x^3 y^{\frac{1}{5}}\right) - \log_3(z^5)$ d) $3 \log_3 x + \log_3\left(\frac{y^{\frac{1}{5}}}{z^5}\right)$
56. Write as one logarithm: $3 \ln x + 2 \ln y$
- a) $\ln\left(x^3 y^{\frac{1}{3}}\right)$ b) $\ln\left(3xy^{\frac{1}{3}}\right)$ c) $\ln\left(x^3 y^2\right)$ ✓ d) $\ln(xy)$
57. Solve using elimination method:
- $$\begin{cases} 2x + y = 1 \\ x - 3y = 2 \end{cases}$$
- a. $x = \frac{5}{7}, y = \frac{-3}{7}$ ✓
- b. $x = 5, y = -3$
- c. $x = \frac{7}{5}, y = \frac{-7}{3}$
- d. $x = 0, y = -1$
58. Solve the linear system using the Gaus-Jordan elimination method :
- $$\begin{cases} x - 2y = 1 \\ 3x + y = 2 \end{cases}$$
- a. $x = -7, y = -4$

b. $x = \frac{5}{7}, y = \frac{-1}{7}$ ✓

c. $x = 4, y = 10$

d. $x = 1, y = 15$

59. Which one is correct about the system of linear equations given below:

$$\begin{cases} x - y + z = 1 \\ 2x + y + z = 2 \\ x + 2y = 0 \end{cases}$$

a. has infinitely many solutions

b. has a unique solution

c. has no solution ✓

d. can not determine

60. Let $A = \begin{bmatrix} 1 & 3 & -7 \\ 5 & 10 & 9 \end{bmatrix}$ and $B = \begin{bmatrix} 8 & 3 & 5 \\ 3 & 1 & 6 \end{bmatrix}$

Which of the following is true.

(a) $a_{23} = 9$

(b) B is a 2×3 matrix

(c) $b_{12} = 3$

(d) $3A = \begin{bmatrix} 3 & 9 & -21 \\ 15 & 30 & 27 \end{bmatrix}$

(e) All of the above ✓

61. Which of the following is true about $A = \begin{bmatrix} -2 & 1 \\ 0 & 7 \\ 8 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 3 & -2 & 1 \\ 5 & 9 & 7 \end{bmatrix}$

a. AB is a defined 3×3 (3 by 3) matrix ✓

b. A^2 is defined

c. BA is defined

d. B^2 is a 2×2 matrix