MA 152 PRACTICE QUESTIONS FOR THE FINAL 10/02

1. Find the distance between $P(4,-3)$ and $Q(2,1)$.
   A. 20 B. $2\sqrt{5}$ C. $2\sqrt{10}$ D. 40 E. $\sqrt{6}$

2. The slope of a line passing through the two points $(1,3)$ and $(3,-2)$ is
   A. $\frac{1}{4}$ B. $\frac{1}{2}$ C. $-\frac{2}{5}$ D. -2 E. None of these

3. $(\frac{1}{2}x-5)^2 =$
   A. $\frac{1}{4}x^2+5x-25$ B. $\frac{1}{4}x^2-5x+25$ C. $\frac{1}{4}x^2-\frac{5}{2}x-25$ D. $\frac{1}{4}x^2-\frac{5}{2}x+25$
   E. None of these

4. The slope of a line perpendicular to the line with the equation $3x-5y+4=0$ is
   A. $-\frac{3}{5}$ B. $\frac{3}{5}$ C. $\frac{5}{3}$ D. $-\frac{5}{3}$ E. None of these

5. Solve for x: $\frac{1}{3}x-1=\frac{1}{5}x+2$.
   A. $x=\frac{45}{2}$ B. $x=\frac{2}{15}$ C. $x=\frac{2}{5}$ D. $x=\frac{15}{2}$ E. There are no solutions

6. Solve for x: $\sqrt{3x+7}=8$.
   A. $x=\frac{1}{3}$ B. $x=5$ C. $x=57$ D. $x=\sqrt{3}$ E. None of these

7. Solve the inequality $3x-7>5x+6$.
   A. $x<-\frac{13}{2}$ B. $x>-\frac{13}{2}$ C. $x<-\frac{1}{2}$ D. $x>-\frac{1}{2}$ E. None of these

8. Solve: $|3x-7|\geq 5$. Express the solution using interval notation.
   A. $(-\infty,-\frac{2}{3}]\cup[4,\infty)$ B. $[\frac{2}{3},\infty)$ C. $(-\infty,-4]\cup[\frac{2}{3},\infty)$ D. $[-4,\infty)$ E. $(-\infty,\frac{2}{3}]\cup[4,\infty)$

9. If y varies inversely as x and $y=18$ when $x=6$, find x when $y=2$.
   A. 54 B. $\frac{1}{54}$ C. $\frac{2}{3}$ D. $\frac{3}{2}$ E. None of these

10. Simplify $\left(\dfrac{a^2b^{-3}}{a^{-3}b^2}\right)^{-2}$
    A. $\frac{b}{a}$ B. $(\frac{a}{b})^2$ C. $(\frac{a}{b})^6$ D. $(\frac{b}{a})^{10}$ E. None of these

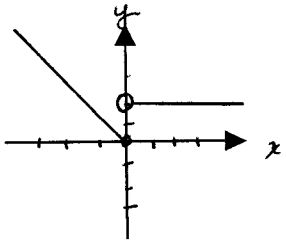
11. Divide and simplify $\dfrac{x^2-2x+1}{x^2-1}\div\dfrac{x^2-3x+2}{x-2}$.
    A. $\dfrac{(x-1)^2}{x+1}$ B. $\dfrac{1}{x+1}$ C. $\dfrac{x-2}{(x+1)(x+2)}$ D. 1 E. None of these

12. Factor: $16x^2-4y^8$
    A. $(4x-y^2)(4x+y^2)$ B. $(4x-2y^4)^2$ C. $4(2x-y^4)(2x+y^4)$ D. $4(2x-y^2)$ E. None of these

13. Find the symmetries, if any, of the graph of $y=2x^2+1$.
    A. about the y-axis B. about the x-axis C. about the origin D. about the y-axis and the origin E. about the x-axis and the origin

14. The equation for the circle with center $(-3,2)$ and radius 5 is:
    A. $(x-3)^2+(y+2)^2=25$ B. $(x+3)^2+(y-2)^2=25$ C. $(x-3)^2+(y-2)^2=5$
    D. $(x-3)^2+(y+2)^2=5$ E. None of these

15. The graph at the right can best be described by which piecewise function?



A. $f(x) = \begin{cases} x & x \le 0 \\ x+2 & x > 0 \end{cases}$ B. $f(x) = \begin{cases} -x & x \le 0 \\ 2x & x > 0 \end{cases}$

C. $f(x) = \begin{cases} x-1 & x \le 0 \\ 2x & x > 0 \end{cases}$ D. $f(x) = \begin{cases} -x & x \le 0 \\ 2 & x > 0 \end{cases}$

E. None of these

16. Solve the system of equations for x : $3x + y = -1,\ x + 2y = 3$.
A. $x = -2$ B. $x = 2$ C. $x = 1$ D. $x = -1$ E. None of these

17. Solve for x : $2x^2 - 3x = 2$.
A. $-\frac{1}{2},\ -2$ B. $-\frac{3}{2},\ 2$ C. $\frac{3}{2},\ 2$ D. $\frac{1}{2},\ -2$ E. None of these

18. Solve for x : $\dfrac{1}{x-4} - \dfrac{1}{x-2} = \dfrac{1}{4}$.
A. $x = 4,\ x = 2$ B. $x = 0,\ x = 2$ C. $x = 0,\ x = 6$ D. $x = 6,\ x = 4$ E. None of these

19. Rationalize the denominator: $\dfrac{2}{\sqrt{x} - 5}$.
A. $\dfrac{2(\sqrt{x}-5)}{x+25}$ B. $\dfrac{2(\sqrt{x}-5)}{x+5}$ C. $\dfrac{2(\sqrt{x}+5)}{x-25}$ D. $\dfrac{2(\sqrt{x}+5)}{x-5}$ E. None of these

20. Multiply and simplify completely: $(3i - 2)(2i - 5)$.
A. $4 + 19i$ B. $-16 - 19i$ C. $4 - 19i$ D. $-16 + 19i$ E. None of these

21. Give the equation of the line in slope-intercept form which is parallel to the line $2x - 3y = 7$ and contains the point $(2, -1)$.
A. $y = \frac{3}{2}x - 4$ B. $y = -\frac{2}{3}x + \frac{1}{3}$ C. $y = \frac{2}{3}x - \frac{7}{3}$ D. $y = \frac{2}{3}x + \frac{8}{3}$ E. None of these

22. One solution of $2x^2 + 2x - 1 = 0$ is
A. $-1 - \sqrt{3}$ B. $-2 - \frac{1}{2}\sqrt{3}$ C. $-2 - \sqrt{3}$ D. $\frac{1}{2} - \frac{1}{2}\sqrt{3}$ E. $-\frac{1}{2} - \frac{1}{2}\sqrt{3}$

23. For $f(x) = \dfrac{8}{x-4}$ find $f(-2)$.
A. -4 B. $\frac{8}{6}$ C. $-\frac{4}{3}$ D. -2 E. None of these

24. Let $f(x) = 4 - x$ and $g(x) = x^2 + 1$. Find $(f \cdot g)(5)$.
A. 26 B. 234 C. -22 D. 2 E. None of these

25. For a one-to-one function, f, given by $f(x) = \dfrac{1}{x+3}$, determine f^{-1}.
A. $f^{-1}(x) = \dfrac{1-3x}{x}$ B. $f^{-1}(x) = \dfrac{1}{3-x}$ C. $f^{-1}(x) = \dfrac{3-x}{1}$ D. $f^{-1}(x) = \dfrac{x+1}{3}$ E. None of these

26. Express in terms of $\log x$, $\log y$ and $\log z$: $\log \sqrt{\frac{z^3}{xy}}$.

A. $\left(\frac{3\log z}{(\log x)(\log y)}\right)^{1/2}$ B. $\frac{3}{2}\log z - \frac{1}{2}\log x - \frac{1}{2}\log y$ C. $(3\log z - \log x - \log y)^{1/2}$

D. $\frac{1}{2}\frac{3\log z}{(\log x)(\log y)}$ E. $\frac{3}{2}\log z - \frac{3}{2}\log x + \frac{3}{2}\log y$

27. $(\frac{1}{8})^{-2/3} =$

A. $\frac{1}{4}$ B. 4 C. $16\sqrt{2}$ D. $\frac{1}{16\sqrt{2}}$ E. None of these

28. Express as a single logarithm and simplify: $\log_a 7 - \log_a 20 + 2\log_a 4$.
A. $\log_a(\frac{28}{5})$ B. $\log_a 3$ C. $\log_a(\frac{7}{10})$ D. $\log_a 6$ E. None of these

29. $\log_2(\frac{1}{16}) =$
A. $\frac{1}{4}$ B. $-\frac{1}{4}$ C. 4 D. -4 E. None of these

30. If $2^{x+1} = 3$, then find x. (Give your answer correct to 2 decimal places.)
A. 0.41 B. 0.50 C. 0.56 D. 0.60 E. 0.58

31. Paul can paint a room in 5 hours. Sally can paint the same room in 3 hours. How long will it take for them to paint the room if they work together?
A. 4 hours B. $1\frac{7}{8}$ hours C. 3 hours D. $\frac{8}{15}$ hours E. None of these

32. The base of a triangle is 5 inches less than its altitude. The area is 18 square inches. Find the base of the triangle.
A. 9 inches B. 6 inches C. 4 inches D. 34 inches E. None of these

33. At 2:00 P.M. two cars start toward each other from towns 240 miles apart. If the rate of one car is 10 mph faster than the other, find the rate of the faster car if the two cars meet at 5:00 P.M.
A. 45 mph B. 35 mph C. 40 mph D. 30 mph E. None of these

34. Two investments are made totaling \$4800. Part of the money is invested at 8% and the rest at 9%. In the first year they yield \$412 in simple interest. How much money is invested at 8%?
A. \$1820 B. \$2980 C. \$2600 D. \$2000 E. None of these

35. A truck enters a freeway traveling 40 mph. One hour later a car enters the same freeway traveling 55 mph. After how many miles will the car overtake the truck?
A. $146\frac{2}{3}$ miles B. $201\frac{2}{3}$ miles C. 120 miles D. $106\frac{2}{3}$ E. None of these

36. The area of a rectangular patio is given by the equation $y = -x^2 + 10x + 200$, where x is measured in feet. Find the maximum area of the patio.
A. 245 ft^2 B. 5 ft^2 C. 275 ft^2 D. 225 ft^2 E. None of these

37. When a certain make of car is purchased for \$18,000, its trade-in value t years after purchase is given by $V(t) = 18,000(.85)^t$ dollars. Find the car's trade in value after 4 years, rounded to the nearest dollar.
A. \$8,604 B. \$5,480 C. \$9,396 D. \$6,120 E. None of these

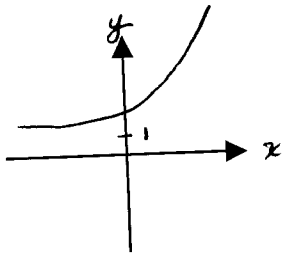
38. At what simple interest rate will \$2000 accumulate to \$3480 in 8 years?
A. 9.25 percent B. 5.75 percent C. 18.5 percent D. 8.5 percent E. None of these

39. What amount invested today will accumulate to \$34,000 by the end of 8 years if it is invested at 8.5% compounded monthly? (Give your answer rounded to the nearest cent.)
A. \$17,702.76 B. \$20,238.09 C. \$66,951.16 D. \$15,186.83 E. \$17,266.32

40. Maria Valdez is going to make 48 quarterly deposits of \$425 in a savings account starting 3 months from now. How much will she have after her last deposit if interest is at 6% compounded quarterly? (Give your answer correct to the nearest dollar.)
A. \$20,400 B. \$25,296 C. \$41,687 D. \$29,565 E. \$32,659

41. Find the periodic payment required to repay a \$20,000 loan over 5 years, with monthly payments at a 6% annual rate.
A. \$1237.51 B. \$487.22 C. \$1267.88 D. \$386.66 E. None of these

42. The graph to the right can best be described by which equation?
A. $y = 2^x + 1$ B. $y = \log_2 x + 1$ C. $y = x^2 + 1$
D. $y = 2^{-x} + 1$ E. $y = \log_2(x + 1)$



SOLUTIONS

1. B; 2. E $(-\frac{5}{2})$; 3. B; 4. D; 5. A; 6. E $(x = 19)$; 7. A; 8. E; 9. A; 10. D; 11. B; 12. C; 13. A; 14. B; 15. D; 16. D; 17. E $(-\frac{1}{2}, 2)$; 18. C; 19. C; 20. C; 21. C; 22. E; 23. C; 24. E (-26); 25. A; 26. B; 27. B; 28. A; 29. D; 30. E; 31. B; 32. C; 33. A; 34. D; 35. A; 36. D; 37. C; 38. A; 39. E; 40. D; 41. D; 42. A.

TABLE OF FORMULAS

1. **CIRCLE**

$$(x-h)^2+(y-k)^2=r^2$$

2. **PARABOLA**

$$y=a(x-h)^2+k$$

The graph of the function

$$y=f(x)=ax^2+bx+c \quad (a\neq 0)$$

is a parabola with vertex at $\left(-\frac{b}{2a},\ c-\frac{b^2}{4a}\right)$.

3. **COMPOUND INTEREST FORMULA.** A principal P, earning interest compounded k times a year for n years at an annual rate r, will grow to the future value FV according to the formula

$$FV=P(1+i)^{kn}$$

where $i=\frac{r}{k}$ is the periodic interest rate.

4. **EFFECTIVE RATE OF INTEREST.** The effective rate of interest R for an account paying a nominal rate r, compounded k times per year, is

$$R=(1+i)^k-1$$

where i is the periodic rate, $i=\frac{r}{k}$.

5. **FUTURE VALUE OF AN ANNUITY.** The future value FV of an ordinary annuity with deposits of P dollars made regularly k times each year for n years, with interest compounded k times per year at an annual rate r, is

$$FV=\frac{P[(1+i)^{kn}-1]}{i}$$

where i is the periodic rate, $i=\frac{r}{k}$.

6. **PRESENT VALUE OF AN ANNUITY.** The present value PV of an annuity with payments of P dollars made k times per year for n years, with interest compounded k times per year at an annual rate r, is

$$PV=\frac{P[1-(1+i)^{-kn}]}{i}$$

where i is the periodic rate, $i=\frac{r}{k}$.

7. **INSTALLMENT PAYMENTS**. The periodic payment P required to repay an amount A is given by

$$P = \frac{Ai}{1 - (1+i)^{-kn}}$$

where

r is the annual rate,

k is the frequency of compounding (usually monthly),

i is the periodic rate, $i = \frac{r}{k}$, and

n is the term of the loan.