MAC 1105 - FINAL REVIEW 1

Time given : 120 minutes

Instructions for doing this practice test

1. Before doing the test
   (a) Avoid any distraction, find a silent place to do the practice exam.
   (b) Make sure you have at least two hours for the practice exam.
2. When doing the practice test
   (a) Do this practice exam in a **single sitting**.
   (b) **Do not check the answer key** until you completely finish taking the practice test.
   (c) **Do not use a calculator**, (unless you've registered with the DRC) lecture notes, the textbook or any other notes you have.
   (d) Try to **time yourself to 120 minutes**.
   (e) Try to be clear about all your steps, even when doing the multiple choice questions.
   (f) **Never guess**, always come to the final answer when doing a problem.
3. After taking the practice test
   (a) Look at the answer key, and mark each question. Questions 1-25 are worth 6 points each (This may not be the way the actual exam is scored).
   (b) For each your wrong answer, find the errors in your steps and redo the problem. You can use your notes and textbook now. But **not a calculator**.
   (c) If you still do not understand how to do a problem, please let me know / come in the office hours I have for this review.

Select the correct answer choice from below

1. Select the answer choice that contains only rational numbers

   (a) $\{\sqrt{6}, 3, \pi^2, 4, -3\}$

   (b) $\left\{-\frac{11}{3}, 5, 0, 2.1\bar{3}, -\sqrt{16}\right\}$

   (c) $\{3.14, -13, \pi, \sqrt{e}\}$

   (d) $\{\pi, \sqrt{4}, \sqrt[5]{13}, 9.1\bar{4}\}$

   (e) $\left\{-9.1\bar{3}, \sqrt[3]{16}, -\frac{3}{18}, 76.2\right\}$

2. Perform the given operation, express the answer as a single polynomial in standard form

$$(3x^2 - 2)^2$$

   (a) $9x^2 - 12x + 4$

   (b) $9x^4 - 12x + 4$

   (c) $9x^2 + 12x + 4$

   (d) $9x^2 - 12x - 4$

   (e) $9x^4 - 12x^2 + 4$

3. Simplify the given expression. Express the answer so that all exponents are positive. Assume all variables represent positive real numbers.

$$-\frac{16y^7p^{-2}}{(2^{-2}y)^{-4}p^{-3}}$$

   (a) $\frac{y^{11}p}{16}$

   (b) $\frac{y^{11}}{16p^5}$

   (c) $-\frac{y^{11}p}{16}$

   (d) $\frac{y^3p}{16}$

   (e) $-\frac{16y^4}{p}$

4. Factor the following expression

$$27x^3 + 8$$

   (a) $(3x + 2)(3x^2 - 6x + 4)$

   (b) $(3x + 2)(3x^2 + 6x + 4)$

   (c) $(3x + 2)(9x^2 - 6x + 4)$

   (d) $(3x + 2)(9x^2 + 6x + 4)$

   (e) $(3x - 2)(3x^2 - 6x + 4)$

5. Add the following rational expression. Leave the answer in factored form. *Hint: First factor the denominator in the first term, then consider the least common denominator.*

$$\frac{3}{x^2+x} - \frac{4}{x} + \frac{1}{x+1}$$

(a) $-\dfrac{(3x-1)}{x(x+1)}$

(b) $\dfrac{(3x-1)}{x(x+1)}$

(c) $-\dfrac{(3x+1)}{x(x+1)}$

(d) $\dfrac{3-3x}{x(x+1)}$

(e) $-\dfrac{4x}{x(x+1)}$

6. Simplify the radical. Assume all the variables represent positive real numbers.

$$\sqrt[3]{32x^7y^{11}}$$

(a) $2x^2y^3\sqrt[3]{4xy^2}$

(b) $2xy^2\sqrt[3]{4xy^7}$

(c) $2x^2y^2\sqrt[3]{4xy^4}$

(d) $2xy\sqrt[3]{4x^4y^8}$

(e) $4x^2y^3\sqrt[3]{2xy^2}$

7. John invests a portion of 6000$ he owns in a bond that earns 10% interest (per year), and he puts the rest in a fixed deposit that earns 5% interest per year. If he earns 500$ as the total interest at the end of the year, what is the amount (in dollars) he puts in to the bond?

(a) 2000

(b) 1000

(c) 3000

(d) 4000

(e) 5500

8. Rationalize the denominator.

$$\frac{\sqrt{5}}{5\sqrt{6}-\sqrt{5}}$$

(a) $\dfrac{\sqrt{30}+1}{31}$

(b) $\dfrac{\sqrt{30}-1}{31}$

(c) $\dfrac{\sqrt{30}+1}{29}$

(d) $\dfrac{\sqrt{6}+1}{29}$

(e) $\dfrac{\sqrt{30}-1}{29}$

9. Solve the radical equation $\sqrt{4x+5}-6=2x-11$

(a) $\{5\}$

(b) $\{1\}$

(c) $\{5,1\}$

(d) $\{-5,-1\}$

(e) No solutions.

10. Write the solutions to the inequality $x^2-x-6>0$ in interval notation.

(a) $(-\infty,-2]\cup[3,\infty)$

(b) $[-2,3]$

(c) (-2.3)

(d) $(-\infty,-2)\cup(3,\infty)$

(e) $\emptyset$

11. Solve the following rational equation.

$$\frac{3}{x+3}=\frac{2}{x-3}-\frac{12}{x^2-9}$$

(a) $\{-3,3\}$

(b) $\{-3\}$

(c) $\{3\}$

(d) $\{0\}$

(e) No Solutions

12. Write the solutions for the following rational inequality in interval notation

$$\frac{x-3}{x+5} \leq 0$$

(a) $[-5, 3]$

(b) $[-3, 5)$

(c) $(-5, 3]$

(d) $(-\infty, -5) \cup (3, \infty)$

(e) $\emptyset$

13. Find the center and the radius of the circle below.

$$4x^2 + 4y^2 + 4x - 16y - 19 = 0$$

(a) center $(-4, 16)$ radius 3

(b) center $(-1/2, 2)$ radius 3

(c) center $(-1/2, 2)$ radius 9

(d) center $(-2, 8)$ radius 9

(e) center $(-1, 4)$ radius 3

14. Solve the absolute value inequality, write your solutions in interval notation

$$|2x + 5| > 3$$

(a) $(-\infty, -4) \cup (-1, \infty)$

(b) $(-4, -11)$

(c) $(-\infty, 4) \cup (-1, \infty)$

(d) $[-4, -11]$

(e) $(-\infty, -4] \cup [-1, \infty)$

15. If $g(x)$ is and odd function, then $g(x - 3)$ is also an odd function.

(a) TRUE

(b) FALSE

16. Find the coordinate of the other end point of the line segment, given its midpoint is $(5, 8)$ and one endpoint is $(13, 10)$.

    (a) $(9, 9)$
    (b) $(18, 18)$
    (c) $(4, 1)$
    (d) $(-4, -1)$
    (e) $(-3, 6)$

17. Find the equation of the line through $(1, 6)$, perpendicular to $3x + 5y = 1$, write your answer in the standard form.

    (a) $5x + 3y = 13$
    (b) $5x - 3y = 13$
    (c) $-5x - 3y = -13$
    (d) $5x + 3y = -13$
    (e) $5x - 3y = -13$

18. Find the equations of any vertical or horizontal asymptotes of the rational function

$$f(x) = \frac{x^2 - 2x - 3}{2x^2 - x - 10}$$

    (a) Vertical asymptotes:$x = -2$; Horizontal asymptote $y = \dfrac{1}{2}$
    (b) Vertical asymptotes:$y = -2, y = \dfrac{5}{2}$; Horizontal asymptote $x = \dfrac{1}{2}$
    (c) Vertical asymptotes: $x = \dfrac{5}{2}$; Horizontal asymptote $y = \dfrac{1}{2}$
    (d) Vertical asymptotes:$x = -2, x = \dfrac{5}{2}$; Horizontal asymptote $y = \dfrac{1}{2}$
    (e) Vertical asymptotes:$y = -2$; Horizontal asymptote $x = 2$

19. Solve the following system of linear equations

$$\begin{cases} 2x - y & = 5 \\ -x + 2y & = -10 \end{cases}$$

    (a) $x = 0$ $y = 5$
    (b) $x = 0$, $y = -5$
    (c) The system is inconsistent and has no solutions.
    (d) $x = 3$ and $y = 7$
    (e) The system has infinitely many solutions of the form $\left\{\left(t, \dfrac{5t - 3}{7}\right)\right\}$ where t is any real number

20. Find the composition $(g \circ f)(x)$ and its domain for $f(x) = \sqrt{x+1}$ and $g(x) = \dfrac{1}{x^2-3}$.

(a) $(f \circ g)(x) = \dfrac{1}{x+2}$ Domain $(-\infty, -2) \cup (-2, \infty)$

(b) $(f \circ g)(x) = \dfrac{1}{x-2}$ Domain $[-1, 2) \cup (2, \infty)$

(c) $(f \circ g)(x) = \dfrac{1}{x-2}$ Domain $(-\infty, 2) \cup (2, \infty)$

(d) $(f \circ g)(x) = \dfrac{1}{x-2}$ Domain $(-1, 2) \cup (2, \infty)$

(e) $(f \circ g)(x) = \dfrac{1}{x-2}$ Domain $(2, \infty)$

21. Find a formula for the inverse function of the one to one function

$$f(x) = \frac{2x+6}{x-3}$$

(a) $f^{-1}(x) = \dfrac{3x+6}{x-2}$

(b) $f^{-1}(x) = \dfrac{3x-1}{x-2}$

(c) $f^{-1}(x) = \dfrac{3x-1}{x+1}$

(d) $f^{-1}(x) = \dfrac{3x+1}{2x-1}$

(e) $f^{-1}(x) = \dfrac{3x+6}{x+2}$

22. Solve the exponential equation

$$(\sqrt{2})^{x+4} = 4^x$$

(a) $x = 4$

(b) $x = -4$

(c) $x = \dfrac{4}{3}$

(d) $x = -\dfrac{3}{4}$

(e) $x = -\dfrac{2}{3}$

23. Write the following expression as a single logarithm.

$$5\log_3(z+7) + \log_3(2z+4) - \frac{1}{2}\log_3(z-1)$$

(a) $\log_3\left(\dfrac{(z+7)^{1/5}(2z+4)}{(z-1)^{-1/2}}\right)$

(b) $\log_3\left(\dfrac{(z+7)(2z+4)}{(z-1)^{-1/2}}\right)$

(c) $\log_3\left(\dfrac{(z+7)(2z+4)}{\sqrt{z-1}}\right)$

(d) $\log_3\left(\dfrac{(z+7)^5(2z+4)}{\sqrt{z-1}}\right)$

(e) $\log_3\left(\dfrac{(z+7)^5(2z+4)}{(z-1)^{-1/2}}\right)$

24. Find the vertical asymptote, x-intercept, and y-intercept of the function

$$f(x) = 3 - \log_2(x+4)$$

(a) Vertical asymptote $x = 4$; x-intercept $(4, 0)$; y-intercept $(0, 1)$

(b) Vertical asymptote $x = -4$; x-intercept $(4, 0)$; y-intercept $(0, 1)$

(c) Vertical asymptote $x = -4$; x-intercept $(2, 0)$; y-intercept $(0, 1)$

(d) Vertical asymptote $x = -2$; x-intercept $(4, 0)$; y-intercept $(0, 1)$

(e) Vertical asymptote $x = -4$; x-intercept $(2, 0)$; y-intercept $(0, -1)$

25. Solve the logarithmic equation

$$\ln(5-x) + \ln(-3-x) = \ln(1-8x)$$

(a) $x = 2$

(b) $x = -2, -8$

(c) $x = 2, -8$

(d) $x = -8$

(e) $x = -2$

ANSWER KEY

1. B
2. E
3. C
4. C
5. C

6. A
7. D
8. C
9. A
10. D

11. E
12. C
13. B
14. A
15. B

16. E
17. E
18. D
19. B
20. B

21. A
22. C
23. D
24. B
25. D