MAC 1105 - FINAL REVIEW 2

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. Find the set that contains only irrational numbers
 - (a) $\{3.14, \sqrt{2}, \sqrt[3]{9}, e\}$ (b) $\{\sqrt{81}, \sqrt[3]{16}, \pi, 2e\}$ (c) $\{\sqrt{-16}, 3^{1/3}, \pi^2, \sqrt{e}\}$ (d) $\{16^{1/3}, 2e, \pi, \sqrt{27}\}$ (e) $\{0, \pi, \frac{1}{e}\}$
- 2. Find the value of the following expression if x = -4 and y = 1

(a)
$$\frac{1}{2}$$

(b) -1
(c) 0
(d) 1
(e) $\frac{1}{4}$

3. Rationalize the denominator

$$\frac{\sqrt{3} + \sqrt{11}}{2\sqrt{3} - \sqrt{11}}$$

 $\frac{|x+2|-y}{2|x|-4|y|}$

- (a) $17 + 9\sqrt{11}$ (b) $-5 - \sqrt{33}$ (c) $17 + 3\sqrt{33}$ (d) $\frac{6 + 2\sqrt{3}}{7}$ (e) $\frac{5 - 3\sqrt{33}}{11}$
- 4. Perform the indicated operations. Express the answer as a single polynomial in standard form.

$$(3x-7)(4x^2-x+3)$$

- (a) $12x^3 28x^2 + 16x 21$
- (b) $12x^3 25x^2 + 16x 21$
- (c) $12x^3 31x^2 + 16x + 21$
- (d) $12x^3 31x^2 + 16x 21$
- (e) $12x^3 54x^2 + 36x 8$

5. Factor the following polynomial by grouping.

$$3x^3 - 6x^2 - x + 2$$

- (a) $(x-2)(3x^2-1)$
- (b) $(x-2)(3x^2+1)$
- (c) $(x+2)(3x^2-1)$
- (d) $(x+2)(3x^2+1)$
- (e) (x-2)(3x-1)
- 6. A rectangle has length 3 meters less than twice the width. If the perimeter of the rectangle is 24 m, what is the width of the rectangle?
 - (a) 3m
 - (b) 5m
 - (c) 8m
 - (d) 7m
 - (e) 4.5m
- 7. Factor the following expression

 $4z^6 - 16z^3 + 7$

- (a) $(2z^3 7)(2z^3 1)$ (b) $(2z^3 + 7)(2z^3 - 1)$ (c) $(2z^3 - 7)(2z^3 + 1)$ (d) $(2z^3 - 7)(2z^3 + 3)$ (e) $(4z^3 - 7)(z^3 + 1)$
- 8. Factor completely

 $8x^3 - 27$

(a) $(2x+3)(4x^2-6x+9)$ (b) $(2x-3)(4x^2-6x+9)$ (c) $(2x-3)(4x^2+6x+9)$ (d) $(2x+3)(4x^2-12x+9)$ (e) $(2x-3)(4x^2+6x-9)$ 9. Perform the operation and write as a radical.

 $y^{1/n}y^{3/n}$

- (a) $\sqrt[n]{y^2}$
- (b) $\sqrt[4]{y^n}$
- (c) $\sqrt[n^2]{y^3}$
- (d) $\sqrt[n]{y^4}$
- (e) $\sqrt[n]{y^3}$
- 10. Solve the rational equation

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

- (a) $\{-1\}$
- (b) $\{0, -1\}$
- (c) $\{0\}$
- (d) $\{1\}$
- (e) No solutions.
- 11. Solve the following radical equation.

$$x - \sqrt{15 - 2x} = 0$$

- (a) No Solutions
- (b) $\{-5\}$
- (c) $\{-5,3\}$
- (d) $\{5\}$
- (e) $\{3\}$

12. Write the solutions to the inequality $2x^2 + 5x - 12 \ge 0$ in interval notation.

(a)
$$(-\infty, -4) \cup \left(\frac{3}{2}, \infty\right)$$

(b) $\left[-4, \frac{3}{2}\right]$
(c) $\left(-4, \frac{3}{2}\right)$
(d) $(-\infty, -4] \cup \left[\frac{3}{2}, \infty\right)$
(e) \emptyset

13. Solve the absolute value inequality. Write your answer in interval notation

 $|2x - 7| + 3 \le 0$

(a) [-5, 5](b) [2, 5](c) \emptyset (d) $(-\infty, \infty)$ (e) $(-\infty, 2] \cup [5, \infty)$

14. Find the x and y intercept(s) of the function

$$f(x) = 3x^2 - 2x - 8$$
(a) x-intercepts $(-2, 0), \left(-\frac{4}{3}, 0\right)$ y-intercept $(0, 8)$
(b) x-intercepts $\left(-\frac{4}{3}, 0\right)$ y-intercept $(0, -8)$
(c) x-intercepts $(-2, 0), \left(\frac{4}{3}, 0\right)$ y-intercept $(0, 8)$
(d) x-intercepts $(-2, 0), \left(\frac{3}{4}, 0\right)$ y-intercept $(0, 8)$
(e) x-intercepts $(2, 0), \left(-\frac{4}{3}, 0\right)$ y-intercept $(0, -8)$

- 15. What is the correct order of transformations you would use in graphing f(x) = -g(x-3) + 7 starting from the parent functions g(x)?
 - (a) Reflect through x-axis, shift 3 units right, shift 7 units down
 - (b) Reflect through x-axis, shift 3 units left, shift 7 units up
 - (c) Reflect through y axis, shift 3 units right, shift 7 units up
 - (d) Shift 3 units left, shift 7 units up, reflect through y axis.
 - (e) Shift 3 units right, reflect through x-axis, shift up 7 units.
- 16. Find the equation of the circle which has center (3, 2) and passing through the point (6, 6)

(a)
$$(x+3)^2 + (y+2)^2 = 25$$

- (b) $(x+3)^2 + (y+2)^2 = 5$
- (c) $(x-3)^2 + (y-2)^2 = 25$
- (d) $(x-3)^2 + (y-2)^2 = 5$
- (e) $(x-3)^2 + (y-2)^2 = 1$

- 17. A student throws his college algebra book straight up in the air from a building. The height of the book from the ground is given by the equation $h(t) = -t^2 + 6t + 16$. Find the time taken to the book to reach maximum height (T_{max}) , and the time taken to the book to hit the ground (T_{ground}) .
 - (a) $T_{max} = 4$ seconds, $T_{qround} = 6$ seconds
 - (b) $T_{max} = 4$ seconds, $T_{ground} = 8$ seconds
 - (c) $T_{max} = 3$ seconds, $T_{qround} = 6$ seconds
 - (d) $T_{max} = 3$ seconds, $T_{ground} = 8$ seconds
 - (e) $T_{max} = 3$ seconds, $T_{qround} = 9$ seconds
- 18. Solve the exponential equation

 $e^{2x} - 4e^x + 3 = 0$

- (a) $x = e, e^{3}$ (b) $x = 1, \ln 3$ (c) x = 1, 3(d) $x = 0, \ln 3$
- (e) x = 0
- 19. Find the vertical asymptotes and the horizontal asymptote of the rational function given below.

$$f(x) = \frac{3x^2 + 2x - 1}{4x^2 + x - 3}$$

- (a) Vertical Asymptote x = 3/4, x = -1; Horizontal asymptote y = 3/4
- (b) Vertical Asymptote x = 3/4; Horizontal asymptote y = 3/4
- (c) Vertical Asymptote x = 4/3; Horizontal asymptote y = 3/4
- (d) Vertical Asymptote x = 3/4, x = -1; Horizontal asymptote y = 0
- (e) Vertical Asymptote y = 3/4; Horizontal asymptote x = 3/4
- 20. Find the answer choice that contains the correct x-intercepts, y-intercept and the coordinate of the hole of the following rational function.

$$f(x) = \frac{x^2 - x - 6}{(x+2)(x^2 - 1)}$$

- (a) x-intercept (3,0); y-intercept (0,3); hole (-2,-5/3)
- (b) x-intercepts (3,0), (-2,0); y-intercept (0,3); hole (-2, -5/3)
- (c) x-intercept (3,0), (-2,0); y-intercept (0,3); no holes
- (d) x-intercept (0,3); y-intercept (3,0); hole (-2,-5/3)
- (e) x-intercept (3,0); y-intercept (0,3); hole (-2,-5/2)

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

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

(a)
$$f^{-1}(x) = \sqrt[3]{(x-3)^2 + 1}$$

(b) $f^{-1}(x) = \sqrt[3]{(x-3)^2 + 1}$
(c) $f^{-1}(x) = \sqrt{(x-3)^2 + 1}$
(d) $f^{-1}(x) = \sqrt[3]{(x+3)^2 + 1}$
(e) $f^{-1}(x) = \sqrt[3]{(x+3)^2 - 1}$

22. Find the composition $(f \circ g)(x)$ and its domain for $f(x) = \frac{1}{x^2 - 4}$ and $g(x) = \sqrt{x - 1}$.

(a)
$$(f \circ g)(x) = \frac{1}{x+5}$$
 Domain $(-\infty, -2) \cup (2, \infty)$
(b) $(f \circ g)(x) = \frac{1}{x-5}$ Domain $[1,5) \cup (5,\infty)$
(c) $(f \circ g)(x) = \frac{1}{x-5}$ Domain $(-\infty,5) \cup (5,\infty)$
(d) $(f \circ g)(x) = \frac{1}{x-5}$ Domain $(1,5) \cup (5,\infty)$
(e) $(f \circ g)(x) = \frac{1}{x-5}$ Domain $[1,\infty)$

23. Find $\left(\frac{f}{g}\right)(x)$ and the domain for

$$f(x) = 2x^2 - 3x + 1$$
 and $g(x) = \frac{x - 1}{x}$

Hint: You might need to factor f(x)

(a)
$$\left(\frac{f}{g}\right)(x) = 2x^2 - x$$
 Domain $x \neq 0, 1$
(b) $\left(\frac{f}{g}\right)(x) = 2x^2 - x$ Domain $x \neq 1$
(c) $\left(\frac{f}{g}\right)(x) = 2x^2 - x$ Domain $x \neq 0$
(d) $\left(\frac{f}{g}\right)(x) = 2x^2 - 1$ Domain $x \neq 0, 1$
(e) $\left(\frac{f}{g}\right)(x) = 2x - 1$ Domain $x \neq 0, 1$

24. Find the domain, range and horizontal asymptotes of the function

$$f(x) = -e^{x-3} + 1$$

- (a) Domain = $(0, \infty)$ Range = $(-\infty, \infty)$ Horizontal asymptote y = 1
- (b) Domain = $(-\infty, \infty)$ Range = $(-\infty, 1)$ Horizontal asymptote y = -1
- (c) Domain = $(-\infty, \infty)$ Range = $(-\infty, 1)$ Horizontal asymptote y = 1
- (d) Domain = $(0, \infty)$ Range = $(-\infty, 1)$ Horizontal asymptote y = -1
- (e) Domain = $(-\infty, 0)$ Range = $(-\infty, 1)$ Horizontal asymptote y = 2
- 25. Solve the following logarithmic equation

$$\log(2x + 1) = \log(x + 8) - \log(x)$$

- (a) x = 0
- (b) x = -2, 2
- (c) x = -2 only
- (d) x = 2 only
- (e) No solutions

ANSWER KEY

- 1. D
- 2. E
- 3. C
- 4. D
- 5. A
- 6. B
- 7. A
- 8. C
- 9. D
- 10. A
- 11. E
- 12. D
- 13. C
- 14. E
- 15. E
- 16. C
- 17. D
- 18. D
- 19. B
- $20. \ \mathrm{A}$
- 21. B
- 22. B
- 23. A
- 24. C
- 25. D