

MATH 1100
Common Final Exam

SPRING 2002
May 4, 2002

Please print the following information:

Name: _____

Instructor: _____

Student ID #: _____

Section/Time: _____

This exam consists of 30 multiple choice questions. As with many standardized tests, a special answer sheet is provided so that your answers can be computer graded. You must use a **PENCIL** with a soft, black lead (#2 or HB) to complete the answer sheet. Be sure to **completely fill in** the space that corresponds to your answer choice. If you change your mind, make sure that you **completely** erase any stray marks. If you mark **two or more** answers corresponding to a **single** problem, then that problem is considered **incorrect**. **YOU ARE NOT PENALIZED FOR GUESSING**. You may perform calculations by writing on the test - not on the answer sheet. You will only receive credit for **Properly marking** the answer sheet. **MAKE SURE THAT YOUR NAME AND I.D. NUMBER APPEAR ON THE ANSWER SHEET IN SPACES PROVIDED FOR THIS PURPOSE.**

QUESTIONS BEGIN ON THE NEXT PAGE AND ARE ON THE FRONT AND BACK OF EACH PAGE FOLLOWING THIS COVER PAGE.

1. Factor **completely** the expression $6x^3 + x^2 - 2x$.

- (a) $x(6x + 1)(x + 2)$
- (b) $x(6x^2 + x - 2)$
- (c) $(3x + 2)(2x - 1)$
- (d) $x(3x + 2)(2x - 1)$
- (e) This expression cannot be factored

2. Perform the indicated operation and simplify the expression $\frac{x}{x+1} - \frac{2x}{x+2}$.

- (a) $\frac{-x^2}{(x+1)(x+2)}$
- (b) $\frac{x-2x}{(x+1)(x+2)}$
- (c) $\frac{-x}{(x+1-x-2)}$
- (d) $\frac{x^2}{(x+2)}$
- (e) $\frac{-2x}{(x+2)}$

3. Simplify the expression $\left(\frac{x^{1/2}}{y^{-1}}\right)^4 \left(\frac{y^{-1/3}}{x^{-2/3}}\right)^3$ and express your answer without any negative exponent.

- (a) $\frac{1}{y^3}$
- (b) x^2y^2
- (c) x^4y^3
- (d) $\frac{x^2}{y^3}$
- (e) None of the above.

4. Solve the equation $5(x-1) - 3[2x + (2-3x)] = 1 + 4x$ for x .

- (a) $x = 0$
- (b) $x = 1$
- (c) $x = 2$
- (d) $x = 3$
- (e) $x = 4$

5. Solve the equation $\frac{2x}{x+3} = -\frac{6}{x+3} - 2$ for x .

Which statement below best describes the solution(s) of the equation.

- (a) There is only one positive solution.
- (b) There is only one negative solution.
- (c) There is one negative and one positive solution.
- (d) The equation has no solution.
- (e) None of the above.

6. The solution set of the inequality $-7 \leq 2 - 3x < 5$ is

- (a) all real x such that $1 < x < 3$
- (b) all real x such that $-1 < x \leq 3$
- (c) all real x such that $-3 < x \leq 1$
- (d) all positive x .
- (e) none of the above.

7 Determine the slope of the line which is **perpendicular** to the line having the equation $2x - 4y = 27$.

- (a) $\frac{1}{2}$
- (b) $-\frac{1}{2}$
- (c) 2
- (d) -2
- (e) -4

8. If the mid-point of the line joining the points $P(2, 3)$ and $Q(-4, y)$ is $(-1, 1)$ then y is

- (a) -1
- (b) 1
- (c) 0
- (d) 2
- (e) -2

9. The domain of the function $f(x) = \sqrt{4 - 3x}$ consists of
- (a) all x such that $x \leq 4/3$.
 - (b) all x such that $x \geq 4/3$.
 - (c) all positive x .
 - (d) all x such that x not equal to zero.
 - (e) none of the above.
10. Which of the following statements below best describes the solution set of the equation $\sqrt{2x - 1} + 2 = x$?
- (a) The equation has two different positive numbers as solutions.
 - (b) The equation has only one negative number as solution.
 - (c) The equation has no solution.
 - (d) The only solution of the equation is a number greater than 3.
 - (e) The only solution of the equation is between 0 and 2.
11. Let $f(x) = -x^3 + 2x^2 - x - 8$. Find the remainder when $f(x)$ is divided by $x + 2$.
- (a) 8
 - (b) -8
 - (c) 10
 - (d) -10
 - (e) None of these.
12. The graph of a certain function is symmetric with respect to the y -axis. If the point $(-2, -3)$ is on the graph of the function, which of the following points **must** also be on the graph?
- (a) $(2, 3)$
 - (b) $(-2, 3)$
 - (c) $(2, -3)$
 - (d) $(0, 0)$
 - (e) $(-3, -2)$
13. The x -intercept of the graph of the equation $3x^2y^3 - x^3y - 3x + 5y = 15$ is
- (a) 0
 - (b) 5
 - (c) 12
 - (d) 3
 - (e) -5

14. Find an equation of the line having x -intercept 2 and y -intercept 4.

- (a) $x = 2y + 4$ (b) $2y = x + 4$ (c) $y = 2x + 4$ (d) $y = -2x + 4$ (e) $y = 2x - 4$

15. The graph of $y = (-x + 1)^3$ can be obtained from the graph of $y = x^3$ by

- (a) first reflecting on the y -axis and then shifting to the left by one unit.
(b) first shifting to the left by one unit and then reflecting on the x -axis.
(c) first shifting to the left by one unit and then reflecting on the y -axis.
(d) first reflecting on the x -axis and then shifting vertically up by one unit.
(e) first reflecting on the y -axis and then shifting vertically up by one unit.

16. Find the equation of the circle with center at the point $(4, -2)$ and passing through the point $(1, 2)$.

- (a) $(x - 2)^2 + (y - 4)^2 = 5$
(b) $(x - 4)^2 + (y - 2)^2 = 5$
(c) $(x - 1)^2 + (y - 2)^2 = 25$
(d) $(x + 4)^2 + (y - 2)^2 = 25$
(e) $(x - 4)^2 + (y + 2)^2 = 25$

17. The equation $|x^2 + 3x - 2| = 2$ has

- (a) two different negative numbers in its solution set.
(b) only two solutions.
(c) no solution.
(d) only two solutions and they are both positive.
(e) none of the above.

18. Suppose that the manufacturer of a gas clothes dryer has found that when unit price is x dollars, the revenue R (in dollars) is $R(x) = -2x^2 + 4000x + 10,000$. What unit price should be established for the dryer to maximize revenue?
- (a) \$ 10,000 (b) \$ 2,000 (c) \$ 1,000 (d) \$ 4,000 (e) \$ 5,000
19. Solve the inequality $\frac{x+3}{x-2} \geq 2$.
- (a) all real x such that $2 < x \leq 7$
(b) all real x such that $x \geq 7$ or $x < 2$
(c) all real x such that $2 \leq x \leq 7$
(d) all real x except $x = 2$
(e) all real x
20. Consider the function $f(x) = \frac{6x^2 - 3x + 7}{2x^2 - 8}$. Which of the following statement best describes the **non-vertical** asymptotes for the graph of $f(x)$.
- (a) The lines $x = 2$ and $x = -2$.
(b) The line $y = 3x$.
(c) The line $y = \frac{1}{2}$.
(d) The line $y = 3$.
(e) There are no non-vertical asymptotes.
21. How long does it take for an investment of \$10,000 to double in value if it is invested at an annual rate of 10% compounded continuously? (Compound interest formula for continuous compounding: $A = Pe^{rt}$)
- (a) 10 years (b) 3.73 years (c) 6.93 years (d) 9.27 years (e) 8.25 years
22. Solve the equation $4^{2x-3} = 8$ for x .
- (a) 3 (b) $\frac{11}{2}$ (c) $\frac{4}{9}$ (d) $\frac{9}{4}$ (e) $\frac{3}{2}$

23. Suppose that $\log_4 x = a$ and $\log_4 y = b$. Then $\log_4\left(\frac{x^2}{y^3}\right)$ is

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

24. Let $\log_3(x) + \log_3(x - 2) = 1$. Solve for x .

- (a) Both $x = -1$ and $x = 3$ are solutions.
(b) The only admissible solution is $x = 3$.
(c) Both $x = 0$ and $x = 2$ are solutions.
(d) The only solution is $x = 2$.
(e) This equation has no solution.

25. Jerry plans to buy a used car for \$18,000 in 5 years. How much money should he invest now at 5% interest rate compounded continuously so that at the end of 5 years he has \$18,000 available?

- (a) \$14,400 (b) \$14,018.41 (c) \$17,223.55 (d) \$19,000.25 (e) None of these.

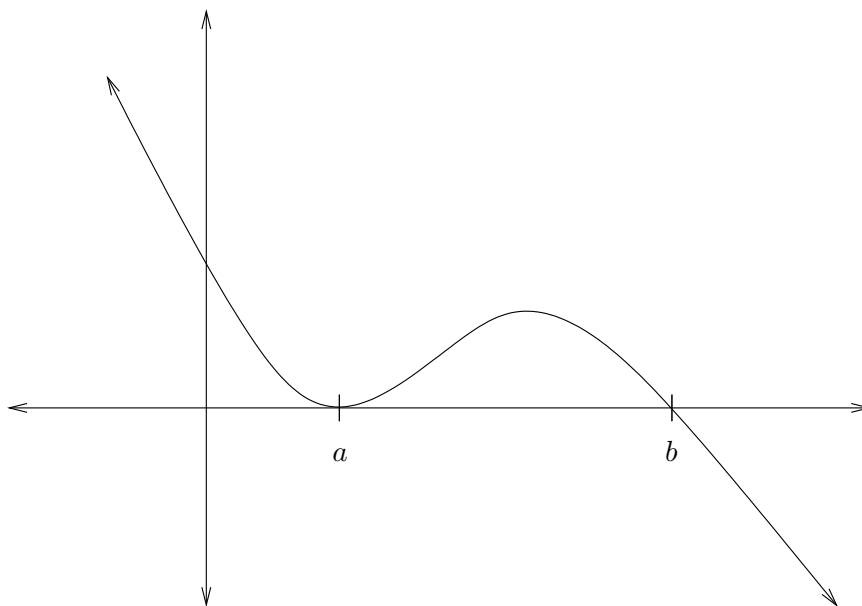
26. The solution to the equation $10^{3x} = 5$ is

- (a) 0 (b) $\frac{\ln 10}{3 \ln 5}$ (c) $\frac{\ln 5}{3}$ (d) $\frac{\log_{10} 5}{3}$ (e) $\frac{\log_{10} 5}{\log_{10} 3}$

27. If $f(x) = 2x^2 - x$ and $g(x) = 2x + 3$ then $(f \circ g)(x)$ equals

- (a) $2(2x + 3)^2 - (2x + 3)$ (b) $4x^2 - 2x + 3$ (c) $2x^2 + x + 3$ (d) $4x^3 - 3x$
(e) none of these.

28. A circle has the equation $x^2 + y^2 + 4x - 4y = 1$. Find its center and radius.
- (a) center $(-2, 2)$, radius 3.
 - (b) center $(2, -2)$, radius 9.
 - (c) center $(0, 0)$, radius 1.
 - (d) center $(-1, 1)$, radius 1.
 - (e) None of the above.
29. The graph of $y = f(x)$ is obtained from the graph of $y = \sqrt{x}$ by first reflecting about the x -axis and then shifting **down** by two units. Then $f(x)$ equals
- (a) $\sqrt{-x} - 2$
 - (b) $-\sqrt{x} + 2$
 - (c) $-\sqrt{x} - 2$
 - (d) $-\sqrt{x+2}$
 - (e) $-\sqrt{x-1}$
30. Which of the following polynomial functions might have the graph shown below?



- (a) $y = x(x - a)^2(x - b)^2$
- (b) $y = (x - a)^3(b - x)$
- (c) $y = (x - a)^2(x - b)^3$
- (d) $y = (x - a)^2(b - x)$
- (e) $y = (x - a)^3(b - x)^2$