MATH 1100  Common Final Exam  SPRING 2006

May 4, 2006

Please print the following information:

Name: ___________________________  Instructor: ___________________________

Student ID #: _____________________  Section/Time: __________________________

The exam consists of 33 multiple choice questions each of equal value. You may do calculations
on this question booklet paper but not on the opscan sheet. Mark beside the number of the opscan
sheet corresponding to the test question number in pencil only. Mark only one answer; otherwise
the answer will be counted as incorrect. You are not penalized for guessing. Please make sure that
your name appears on the opscan sheet in the spaces provided.

Questions begin on page 1 and be sure to check the back of each page for questions.

At the end of the examination, you MUST hand in this test booklet, your answer
sheet and all scratch paper.
1. \((2x + 3)^2 = ?\)
   a. \(4x^2 + 12x + 6\)  
   b. \(4x^2 + 9\)  
   c. \(4x^2 + 12x + 9\)  
   d. \(4x^2 + 8x + 4\)  
   e. \(4x^2 + 8x + 9\)

2. \(\left(\frac{x^3y^4}{4x^5}\right)^2 = ?\)
   a. \(\frac{x^6y^8}{16x^5}\)  
   b. \(\frac{x^6y^8}{4x^5}\)  
   c. \(\frac{16x^2}{x^3y^2}\)  
   d. \(\frac{x^4y^8}{16}\)  
   e. \(\frac{y^8}{16x^4}\)

3. \((3x - 2)(x + 6) = ?\)
   a. \(4x^2 - 16x + 4\)  
   b. \(3x^2 - 8x - 12\)  
   c. \(4x^2 - 8x + 4\)  
   d. \(12x + 4x^2\)  
   e. \(3x^2 + 16x - 12\)

4. \(\frac{2x}{x + 3} + \frac{2}{3x + 4} = ?\)
   a. \(\frac{2x + 2}{(x + 3)(3x + 4)}\)  
   b. \(\frac{6x^2 + 10x + 6}{(x + 3)(3x + 4)}\)  
   c. \(\frac{3x^2 + 6x + 6}{(x + 3)(3x + 4)}\)  
   d. \(\frac{3x^2 + 6x - 6}{(x + 3)(3x + 4)}\)  
   e. \(\frac{3x^2 + 6x - 8}{(x + 3)(3x + 4)}\)

5. If one solves the inequality \(5 < 2x + 1 < 7\), one obtains the interval
   a. \((2, 3)\)  
   b. \((-4, -2)\)  
   c. \((1, 2)\)  
   d. \((-3, -1)\)  
   e. \((0, 2)\)
6. Which of the following is a factor of \(x^2 - 7x + 10\)?
   a. \(x + 2\)  b. \(x + 10\)  c. \(x - 2\)  d. \(x + 5\)  e. \(x + 7\)

7. Which of the following is a factor of \(x^3 - 27\)?
   a. \(x^2 - 3x + 9\)  b. \(x^2 + 3x + 9\)  c. \(x^3 + 3x - 9\)  d. \(x + 3\)  e. \(x + 9\)

8. If \(x\) is the solution of \(3x + 1 = 16\), then \(x^2 = \) ?
   a. 9  b. 4  c. 16  d. 25  e. 36

9. How many real solutions does \(x^2 + 5x + 3 = 0\) have?
   a. none  b. 3  c. 2  d. 1  e. 4

10. A car rental agency charges $200 a week and 20 cents a mile. How far can you travel in one
    week for $560?
    a. 360 miles  b. 1200 miles  c. 1800 miles  d. 1150 miles  e. 14000 miles
11. An automobile has a price of $12,000 after being discounted 20%. What is the original price?
   a. 16000  b. 15000  c. 14000  d. 18000  e. 20000

12. What is the distance in the $xy$ plane from $(4, 5)$ to $(1, 1)$
   a. 1  b. 3  c. 4  d. 5  e. 6

13. The graph of an odd function $f(x)$ is symmetric about the origin. If $(2, -1)$ is on the graph which of the following points must also be on the graph?
   a. $(-2, -1)$  b. $(2, 1)$  c. $(2, -1)$  d. $(-2, 1)$  e. $(1, 2)$

14. What is the slope of the line through $(3, 9)$ and $(0, 0)$
   a. 1  b. 2  c. 3  d. 4  e. 5

15. The center and radius of the circle $x^2 - 5x + (y - 9)^2 = 6$ are
   a. center $(5, 9)$ radius 6  b. center $(\frac{5}{2}, 9)$ radius $\frac{7}{2}$  c. center $(5, 9)$ radius $\sqrt{6}$
   d. center $(\frac{5}{2}, 9)$ radius $\sqrt{6}$  e. center $(5, 9)$ radius $\sqrt{31}$
16. What is the slope of any line perpendicular to the line \( 2y + 8x = 18 \)
   a. 1  b. \( \frac{1}{2} \)  c. \( \frac{1}{3} \)  d. \( \frac{1}{4} \)  e. \( \frac{1}{8} \)

17. Let \( f(x) = \sqrt{\frac{3-x}{x+1}} \). Then the domain is
   a. \([-3, 1]\)  b. \((-1, 3]\)  c. \(x \neq -1\)  d. \((-3, -1]\)  e. \(x \neq -1, 3\)

18. What is the range of \( f(x) = x^3 \)
   a. \((-\infty, \infty)\)  b. \([1, \infty)\)  c. \([0, \infty)\)  d. \([4, \infty)\)  e. \([3, \infty)\)

19. If \( f(x) = (x-2)^2 \), then \( f(x) \) is increasing on
   a. \((2, \infty)\)  b. \((0, \infty)\)  c. \((-1, \infty)\)  d. \((-\infty, 0)\)  e. \((-2, \infty)\)

20. Let \( f(x) = x^2 - x \). The average rate of change of \( f \) from \( x = 1 \) to \( x = 2 \) is
   a. 5  b. 4  c. 3  d. 2  e. 0
21. Let \( f(x) = \sqrt{x + 1} \). If the graph of this function is shifted right three units, shifted up 3 units, and then reflected about the \( x \)-axis, then the function yielding this graph would be:
   a. \(-\sqrt{x-2} - 3\)  
   b. \(-\sqrt{x-3} - 3\)  
   c. \(-\sqrt{x+1} - 3\)  
   d. \(\sqrt{x+1} + 3\)  
   e. \(-\sqrt{x-2} + 3\)

22. Let \( f(x) = \frac{1}{x+2} \) and \( g(x) = \frac{4}{x-1} \). Then \((fog)(x) =
   a. \(\frac{x+5}{x+2}\)  
   b. \(\frac{x-1}{2x+2}\)  
   c. \(\frac{x+1}{x+2}\)  
   d. \(\frac{4}{(x+2)(x+1)}\)  
   e. \(\frac{x+2}{x+1}\)

23. The vertex of the parabola \( y = x^2 + 2x + 1 \) is
   a. \((-1,0)\)  
   b. \((0,1)\)  
   c. \((-1,1)\)  
   d. \((1,0)\)  
   e. \((0,-1)\)

24. Find the real roots of \( x^4 - 2x^3 - x^2 + 2x \) and add them together, you obtain:
   a. 4  
   b. 3  
   c. 2  
   d. 1  
   e. 0

25. Let \( f(x) = \frac{6x^3}{(x^2 - 1)(2x + 1)} \). Then a horizontal asymptote is
   a. \(y = 3\)  
   b. \(y = 2\)  
   c. \(y = 1\)  
   d. \(y = 6\)  
   e. \(y = 4\)
26. Let \( f(x) = \frac{x^2}{x^2 - 4} \). Then the number of vertical asymptotes (how many) is
   a. 3  
   b. 2  
   c. 1  
   d. 0  
   e. 4

27. Let \( f(x) = \frac{x^2}{x+1} \). Then the oblique asymptote is
   a. \( y = x - 1 \)  
   b. \( y = x + 1 \)  
   c. \( y = x + 2 \)  
   d. \( y = x - 2 \)  
   e. \( y = x - 3 \)

28. Let \( y = \frac{1}{1+x} \), then the inverse function is
   a. \( \frac{x}{x-1} \)  
   b. \( -\frac{x}{x-1} \)  
   c. \( \frac{1-x}{x} \)  
   d. \( \frac{x-1}{x} \)  
   e. \( \frac{x+1}{x} \)

29. If one combines \( \ln(x) + \ln(x+2) - \ln(z^3) \) into a single expression one gets
   a. \( \ln(2x^2 + 2 - z^3) \)  
   b. \( \ln\frac{x^3(x+2)}{z^2} \)  
   c. \( \ln\frac{z^3}{x(x+2)} \)  
   d. \( \ln\frac{x(x+2)}{z^3} \)  
   e. \( \ln\frac{x^2(x+2)}{z^3} \)

30. If one computes \( \log_8 16 \) one obtains
   a. 2  
   b. 1.42  
   c. \( \sqrt{8} \)  
   d. \( \frac{4}{3} \)  
   e. 1.44
31. Given that $2^z = 5$, and $\ln x = 2$, then when one computes $z + x$ one obtains
   a. 9.05    b. 9.71    c. 7.12   d. 9.86   e. 7.56

32. If $3600$ is invested at 10% compounded quarterly how much is in the account after 20 yrs?
   a. $27,345    b. $28,678   c. $25,954   d. $25,120   e. $26,225

33. How long does it take money to triple if it is invested at 15% compounded continuously?
   a. 8.56 yrs   b. 9.86 yrs   c. 7.46yrs   d. 7.32yrs   e. 7.25yrs

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