

## Practice Final Exam, Math 1031

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Last Name: \_\_\_\_\_

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ID: \_\_\_\_\_ Section: \_\_\_\_\_

Math 1031  
December , 2004

There are **22** multiple machine graded questions and **6** write-out problems .

**NO GRAPHIC CALCULATORS** are permitted. **GOOD LUCK !**

**MC1.** Consider the parabola  $y = -3(x + 5)^2$ . The coordinates of its vertex are:

- a) (1, 1)
- b) (0, 0)
- c) (5, 0)
- d) None of the above

**MC2.** What is the relation between the two lines defined by the equations  $3x - 2y = 0$  and  $6y - 9x = 1$

- a) They are the same
- b) They are perpendicular to each other
- c) The lines are parallel to each other
- d) The lines intersect at the origin
- e) None of the above

**MC3.** Let  $f(x) = \sqrt{x^2 + 1}$  defined for  $x > 0$ . The inverse function,  $f^{-1}$ , is:

- a)  $\frac{1}{\sqrt{x^2+1}}$
- b)  $x$
- c)  $x^2$
- d)  $\sqrt{x^2 - 1}$
- e) None of the above

**MC4.** Let  $f(x) = \sqrt{x^2 - 1}$ , then the domain of  $f$  is:

- a)  $x > 0$
- b)  $x < -1$
- c)  $x > 1$
- d)  $x > 2$
- e) None of the above

**MC5.** Let  $f(x) = \sqrt{x^2 + 1}$  and  $g(x) = x^3$ , then  $(f \circ g)(2) =$

- a)  $\sqrt{65}$
- b) 8
- c)  $\sqrt{5}$
- d) 0
- e) None of the above

**MC6.** Let  $f(x) = \sqrt{x^3 - 2}$  and  $g(x) = 1 - x$ , then  $(f \circ g)(1)$  is:

- a) 10
- b)  $x^3 - x - 1$
- c) Not defined
- d) 0
- e) 1

**MC7.** The solution set of the equation  $\frac{3x^2 - 6}{x^2 - 2} = 3$  is

- a)  $x = -1$
- b) all real numbers

- c) all real numbers except  $x = \sqrt{2}$
- d)  $x = \sqrt{2}$
- e) None of the above

**MC8.** A DVD player is sold for \$210 after 10% discount. The original price of the player was:

- a) \$300
- b) \$220
- c) \$231
- d) \$1000
- e) None of the above

**MC9.** You are given a quadratic equation

$$x^2 - 3x + c = 0$$

in which  $c$  is a constant that you don't know. Suppose that one of the solutions is  $x = 2$ . The other solution is then:

- a)  $x = 4$
- b)  $x = -3$
- c)  $x = 1$
- d) 0
- e) The answer cannot be determined because  $c$  is unknown.

**MC10.** The solution of the inequality  $(x + 1)(x^2 - 1) \geq 0$  is:

- a)  $x > 1$
- b)  $x > -1$

- c)  $x \leq -1$  or  $x \geq 1$
- d)  $x < 0$
- e) None of the above

**MC11.** Since  $f(x) = 3^x + 2^x$  is an increasing function, it is invertible. Then  $f^{-1}(5) =$

- a) 0
- b) 200
- c)  $243 + 32$
- d) 1
- e) None of the above

**MC12.** The solution set of the inequality  $(1 - x^2)^8 + 1 > 0$  is:

- a) all real numbers
- b)  $x > 1$
- c)  $x > -1$
- d)  $x < -1$
- e) all real numbers except 1

**MC13.** The value of the expression  $(3^{2/3})^{3/4}$  is:

- a)  $\sqrt{3}$
- b) 27
- c) 81
- d)  $\frac{1}{9}$
- e) None of the above

**MC14.** Let  $f(x) = x(x^2 - 1)$ . The number of turning points of the function is:

- a) 0
- b) 1
- c) 2
- d) 3
- e) None of the above

**MC15.** The unique solution of the equation  $e^x = e - \ln(x)$  is:

- a)  $x = \ln(e - 1)$
- b)  $x = 2.716$
- c)  $x = 1$
- d)  $x = 0$
- e) None of the above

**MC16.** In how many ways you can arrange 2 different mathematics texts, three different English texts and four different history texts on a bookshelf when books in the same subject must be kept together?

- a) 6
- b) 288
- c) 864
- d) 1728
- e) 5184

**MC17.** In how many ways can 2 passengers be seated in a van with 3 passenger seats?

- a) 6

- b) 3
- c) 9
- d) 4
- e) None of the above

**MC18.** A fair coin is tossed and a card is drawn at random from a standard deck of 52 cards. The probability that the coin shows a head and that the card is a king is:

- a)  $1/2$
- b)  $4/52$
- c) 1
- d)  $2/52$
- e) None of the above

**MC19.** Two fair dice are rolled. What is the probability their sum is odd?

- a)  $\frac{1}{4}$
- b) 0.6
- c)  $-1$
- d)  $\frac{1}{2}$
- e) None of the above

**MC20.** Suppose that  $x$  and  $y$  are two real, positive numbers such that  $xy = \frac{1}{9}$ . If  $\log_3(x) = -1$ , then  $\log_{\frac{1}{3}}(y) =$

- a) 0
- b) 1

- c) 3
- d)  $-1$
- e) None of the above

**MC21.** You play a game in which, first, you roll a die and second you flip a coin once, if the number on the die is odd and twice if the number on the die is even. You are paid a dollar for each head and you have to pay one dollar for each tail you obtain. What is your expected gain?

- a) 0
- b) 1
- c) 3
- d)  $-1$
- e) None of the above

**MC22.** Scientists are trying to determine whether two different diseases which affect chickens are actually related. After they tested a large number of chickens they obtained the following informations. Out of all the chickens 60% have the disease  $A$  but only 10% of these are affected by disease  $B$ . Of those 40% who don't have the disease  $A$ , only 20% have the disease  $B$ . What is the probability that a randomly selected chicken has the disease  $A$ , given that it has the disease  $B$ ?

- a) 0.4
- b) 0.2
- c) 0.3
- d)  $\frac{15}{19}$
- e) None of the above



**Pb23.** Consider the following equation, which defines a line in the plane.

$$6x + 3y - 8 = 0$$

What is the equation of the line perpendicular to the given line and which passes through the origin?

**Pb24.** 20 liters of saline solution has a concentration of 10% salt. How many liters of solution have to be replaced by pure salt to obtain a 50% solution?

**Pb25.** Bob invests \$2000 in an account with continuously compounded interest. After two years the balance is \$2800. What was the annual interest rate?

**Pb26.** A certain radioactive material has a half-life of 100 years. Find out how long will it take for a chunk of this material to be reduced to 30% of its initial amount.

**Pb27.** Let  $f(x) = -x^2 + 6x - 5$ .

- a) Sketch the graph of this function.
- b) What is the range of the function?
- c) For what values of  $x$  is this function increasing?

**Pb28.** At a certain pastry shop they bake three types of muffins, namely chocolate, strawberry, and banana muffins. In an average day the probability that the muffins are not fresh are 0.5 for chocolate muffins, 0.2 for strawberry muffins and 0.1 for banana muffins. If you randomly select a muffin from a basket containing equal numbers of chocolate, strawberry and banana muffins, what is the probability you selected a strawberry muffin given that the muffin is fresh?