Fall 2014,   MATH 142 − 502, 504

EXAM 1 − Form A

INSTRUCTOR: M. Vorobets

NAME (print): _____

On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work.

SIGNATURE: _____

UIN: _____

SECTION NUMBER: _____

INSTRUCTIONS

1. There are 20 questions and 7 pages to this exam including the cover sheet. The true-false questions are worth 2 points each, the multiple choice questions are worth 6 points each.

2. Fill in your scantron with the appropriate information. To avoid a possible 10 point penalty, you must fill in and bubble your Last Name, First Name, MI, DEPT (MATH), Course No. (142), Section (502 or 504), UIN, and Test Form. Please also write "Vorobets" in the Instructor field, "Exam 1" in the Exam Field, your regular seat number in the date field, and then sign in the appropriate place. No partial credit is possible.

3. Disputes about grades on this exam must be handled the day the exam is handed back and must be discussed before you leave the room. If the exam leaves the room, it will not be re-evaluated (except for possible adding mistakes).

4. Your grade on the exam will be written on the last page.

True-False (2 points each): Determine whether each of the following is True or False. Clearly circle the correct answer. No partial credit will be given.

Use the following graph of the function f to answer Questions 1-5:
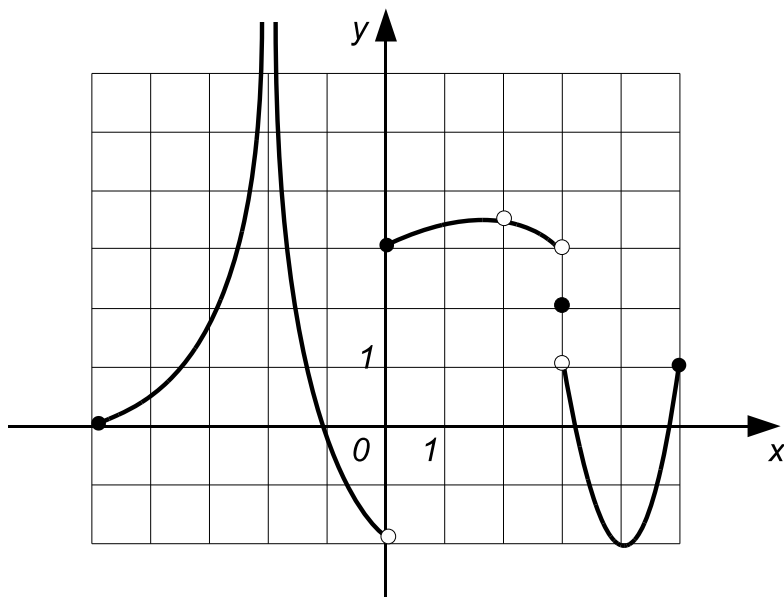
1. $\lim\limits_{x \to 3} f(x) = 2$

     TRUE   FALSE

2. The line $x = -2$ is the vertical asymptote for the graph of the function f.

     TRUE   FALSE

3. $\lim\limits_{x \to 0^-} f(x) = 3$

     TRUE   FALSE

4. $f'(2)$ does not exist because f is discontinuous at $x = 2$.

     TRUE   FALSE

5. $f'(4) = 0$.

     TRUE   FALSE

Multiple Choice (6 point each): Circle the letter of the correct answer. No partial credit will be given.

6. If $\log_a(3x + 2) = 3$, $a > 1$ what is x?

   (a) 4

   (b) $\dfrac{a^3 - 2}{3}$

   (c) $\dfrac{3^a - 2}{3}$

   (d) $\dfrac{2^a - 3}{2}$

   (e) $\dfrac{a^2 - 3}{2}$

7. A company that produces and sells Aggie T-shirts established the price-demand function

$$p(x) = 21 - 0.1x,$$

   where $p(x)$ is the price per T-shirt at which x T-shirts can be sold. Suppose that the company must produce at least 50 shirts and its cost equation is

$$C(x) = 2x + 250.$$

   How many T-shirts must the company produce nd sell to break-even? **Round your answer to the nearest T-shirt.**

   (a) 145

   (b) 154

   (c) 167

   (d) 287

   (e) 176

8. The solution to the equation $b^{2x+3} = \dfrac{1}{b^2}$, $b > 0$ is

   (a) 0

   (b) $\dfrac{3}{2}$

   (c) $-\dfrac{3}{2}$

   (d) $\dfrac{5}{2}$

   (e) $-\dfrac{5}{2}$

9. If \$3000 is invested at 5% interest per year, find the value of the investment at the end of 5 years if the interest is compounded monthly. **Round your answer to the nearest cent.**

   (a) \$3352.06

   (b) \$3000

   (c) \$2871.45

   (d) \$5428.37

   (e) \$3850.08

10. Simplify the following using properties of logarithms:

$$\log_7 x - \frac{1}{2}\log_7 y + 5\log_7 z$$

   (a) $\log_7\left(\dfrac{xz^5}{\sqrt{y}}\right)$

   (b) $\log_7\left(x - \dfrac{1}{2}y + 5z\right)$

   (c) $x - \dfrac{1}{2}y + 5z$

   (d) $\dfrac{xz^5}{\sqrt{y}}$

   (e) 0

11. The revenue (in dollars) from the sale of x plastic planter boxes is given by

$$R(x) = 20x - 0.02x^2, \quad 0 \le x \le 1,000.$$

   What is the average change in revenue if production is changed from 100 planters to 400 planters.

   (a) \$500

   (b) \$1,000

   (c) \$30

   (d) \$3,000

   (e) \$10

12. Find $\lim\limits_{x \to -a} \dfrac{x^2 - a^2}{(x+a)(x-b)}$, where a and b are arbitrary constants.

(a) $\dfrac{2a}{a-b}$

(b) 0

(c) $\dfrac{2b}{a+b}$

(d) ∞

(e) $\dfrac{2a}{a+b}$

13. The domain of the function

$$f(x) = \begin{cases} \sqrt{2x-1}, & \text{if } x \leq 5 \\ \frac{1}{1-x}, & \text{if } x > 5 \end{cases}$$

is

(a) $(-\infty, 1/2) \cup (1/2, 1) \cup (1, \infty)$

(b) $[1/2, 1) \cup (1, \infty)$

(c) $(-\infty, 1/2) \cup (1/2, 1) \cup (1, 5) \cup (5, \infty)$

(d) $(-\infty, 1) \cup (1, \infty)$

(e) $[1/2, \infty)$

14. Find $\lim\limits_{x \to \infty} \dfrac{1 + 2x - x^2}{1 - x + 2x^2}$

(a) -2

(b) $\dfrac{1}{2}$

(c) $-\infty$

(d) 1

(e) $-\dfrac{1}{2}$

15. Find $\lim\limits_{x \to 2^-} \dfrac{|3x - 6|}{6 - 3x}$

(a) 0

(b) 2

(c) -1

(d) $-\infty$

(e) 1

5

16. At a price of $9.00 per box of oranges, the supply is 320 boxes and the demand is 200 boxes. At a price of $8.50 per box, the supply is 270 boxes and the demand is 300 boxes. Find the **equilibrium quantity**.

    (a) 20

    (b) 32

    (c) 30

    (d) 28

    (e) 14

17. An account with the initial amount of $1,000 is growing at 9% a year, compounding continuously. Find the time it takes for this account to double. Round your answer to the nearest year.

    (a) 8

    (b) 7

    (c) 9

    (d) 4

    (e) 6

18. For what value of constant c is the function f continuous on $(-\infty, \infty)$?

$$f(x) = \begin{cases} cx + 1 & \text{if } x \leq 3 \\ cx^2 - 1 & \text{if } x > 3 \end{cases}$$

    (a) $\dfrac{1}{5}$

    (b) 5

    (c) 1

    (d) $\dfrac{1}{3}$

    (e) None of these

19. Suppose an object moves along the y axis so its location is $y = t^2 + t$ at time t (y is in meters and t is in seconds). Find the instanteneous velocity at $t = 2$ seconds.

    (a) 2

    (b) -3

    (c) 6

    (d) 3

    (e) 5

20. All of the following functions are polynomials EXCEPT:

(a) $f(x) = 1 - 4x + 15x^{21}$

(b) $g(x) = x - 5x^2 + 4x^3$

(c) $h(x) = 5 - x^{\pi}$

(d) $r(x) = x^2 + 3x - 1$

(e) None of these