

MA 152

EXAM 3

SPRING 2003

Name: _____

Student ID: _____

Instructor: _____

Section Number: _____ Class Time: _____

Instructions:

- (1) Please fill in all the above information.
- (2) You must use a #2 pencil on the answer sheet.
- (3) On the answer sheet, fill in:
 - a) Your last name, first name and middle initial and blacken the appropriate spaces.
 - b) Your division and section number and blacken the appropriate spaces.
(If you do not know your division and section number, ask your instructor.)
 - c) Your student identification number and blacken the appropriate spaces.
 - d) Leave the test/quiz number blank.
 - e) Sign your name.
- (4) Make sure that the cover of this exam matches the color of your answer sheet.
- (5) There are 15 questions. On the answer sheet, blacken your choice of the correct answer in the spaces provided for questions 1-15. Do all of your work on the question sheets. Turn in the answer sheet when you leave and keep the question sheet. Only the answer sheet will be graded.
- (6) All questions are worth the same. Please answer every question. No points will be deducted for wrong answers.
- (7) Only non-graphing calculators are allowed.
- (8) The exam is self-explanatory. Do not ask an instructor questions about any of the exam problems.

- 1) z is inversely proportional to the sum of x and y . If $x = 2$ and $y = 3$, then $z = 15$. Find the constant of proportionality, k .

A. $k=3$

B. $k=90$

C. $k=\frac{5}{2}$

D. $k=6$

E. $k=75$

- 2) The force f required to stretch a spring d units is directly proportional to d . A force of 10 newtons stretches a spring 0.4 meter. What force will stretch the spring 0.7 meter?

A. $f=17.5$

B. $f=1.75$

C. $f=0.28$

D. $f=5.7$

E. $f=2.8$

- 3) If $f(x)=x^2-5$, find and simplify $f(x+2)$.

A. x^2-3

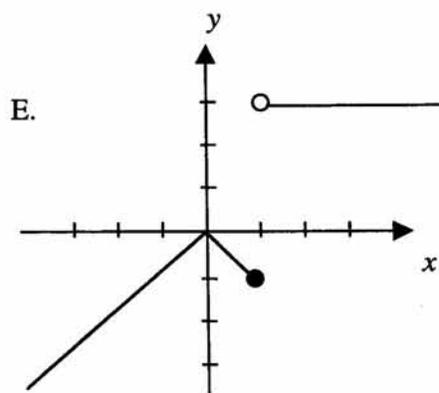
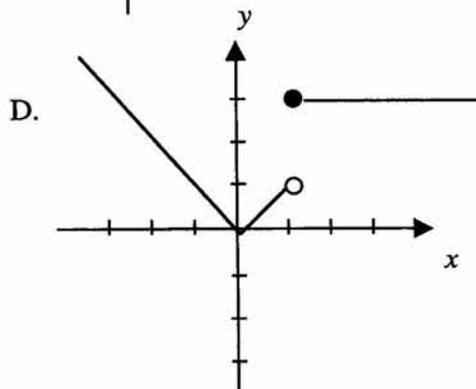
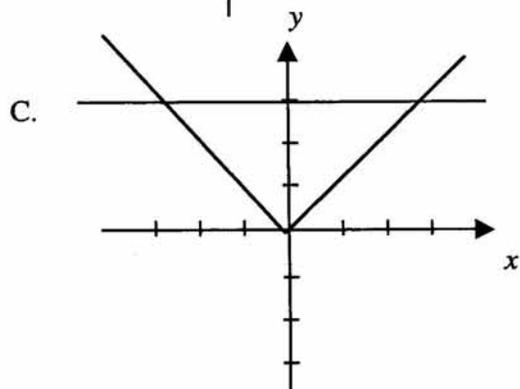
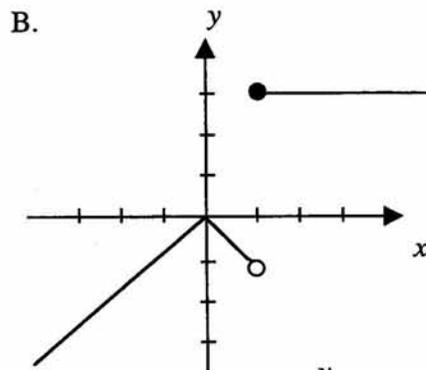
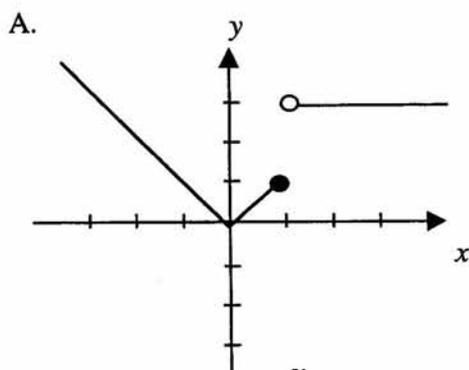
B. x^2+4x+4

C. x^2+4x-1

D. x^2-1

E. None of these.

4) Choose the correct graph for $f(x) = \begin{cases} |x| & \text{if } x < 1 \\ 3 & \text{if } x \geq 1 \end{cases}$



5) The intensity I of light (in lumens) at a distance x meters below the surface is given by $I = I_0 k^x$, where I_0 is the intensity at the surface and k depends on the clarity of the water. At one location in the Atlantic Ocean, $I_0 = 10$ and $k = 0.4$. Find the intensity at a depth of 3 meters.

- A. 12 lumens
- B. 64 lumens
- C. 0.12 lumens
- D. 1.2 lumens
- E. 0.64 lumens

Use $f(x)=2x+7$ and $g(x)=\sqrt{x}$ for questions 6 and 7.

6) Find $(f-g)(16)$.

- A. 17
- B. 35
- C. 15
- D. 25
- E. 31

7) Find $(g \circ f)(9)$.

- A. 75
- B. 39
- C. 13
- D. 5
- E. 125

8) If $f(x)=\frac{x+7}{2}$, $f^{-1}(x)=$

- A. $\frac{x-7}{2}$
- B. $x-\frac{7}{2}$
- C. $2x-7$
- D. $2(x-7)$
- E. None of these.

9) The graph of $y=a^x$, where $a > 1$, is in which quadrants?

- A. All four quadrants
- B. I and II
- C. II and III
- D. III and IV
- E. I and IV

10) Write this equation in logarithmic form.

$$5^{-2} = \frac{1}{25}$$

A. $\log_5 \frac{1}{25} = -2$

B. $\log_2 \frac{1}{25} = -5$

C. $\log_5(-2) = \frac{1}{25}$

D. $\log_{\frac{1}{25}} 5 = -2$

E. $\log_{25} 5 = -2$

11) If M is the theoretical maximum charge that a battery can hold and k is a positive constant that depends on the battery and the charger, the length of time (in hours) required to charge the battery to a given level C is given by $t = -\frac{1}{k} \ln\left(1 - \frac{C}{M}\right)$. If $k=0.117$, how long will it take a battery to reach a 75% charge? Assume that the battery was fully discharged when it began charging.

A. about 2.5 hr

B. about 1.9 hr

C. about 5.1 hr

D. about 1.1 hr

E. about 11.8 hr

12) Write this expression as the logarithm of one quantity.

$$\log_b x + \frac{1}{2} \log_b y - 3 \log_b z$$

A. $\log_b \left(\frac{x + \sqrt{y}}{-3z} \right)$

B. $\log_b \left(\frac{\sqrt{xy}}{z^3} \right)$

C. $\log_b \left(\frac{x\sqrt{y}}{z^3} \right)$

D. $\log_b \left(\frac{x + \sqrt{y}}{z^3} \right)$

E. None of these.

13) Solve. $\log_2(x+2) - \log_2(x-1) = 4$

- A. $x=2$
- B. $x=6$
- C. $x=\frac{10}{7}$
- D. $x=\frac{6}{5}$
- E. There is no solution.

14) Solve for a .

$$\begin{aligned}3a+2b&=1 \\ 2a+3b&=9\end{aligned}$$

- A. $a=5$
- B. $a=2$
- C. $a=-1$
- D. $a=\frac{21}{5}$
- E. $a=-3$

15) Mark can canoe 24 km downstream in 4 hours. The return trip takes him 12 hours. What is Mark's speed in still water and the speed of the current? Set up the needed equations using m for Mark's speed and c for the speed of the current. Simplify, but do not solve.

- A. $\begin{aligned}12m-c&=24 \\ 4m+c&=24\end{aligned}$
- B. $\begin{aligned}m-c&=6 \\ m+c&=2\end{aligned}$
- C. $\begin{aligned}4m-c&=24 \\ 12m+c&=24\end{aligned}$
- D. $\begin{aligned}m-c&=2 \\ m+c&=6\end{aligned}$
- E. None of these.