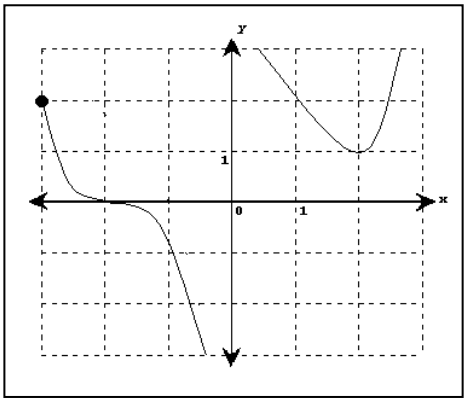
ANSWER KEY

MAC2233	Name: _____
Chapter 5	Date: _____
Practice for the Exam (V1)	Section: _____

1. Let $f(x)=(x-1)^{2/3}+3$ with domain $[0,8]$. Which of the following is true about the graph of f ?
   A. There is an absolute maximum at $x=0$.
   B. There is a relative maximum at $x=1$ and an absolute minimum at $x=8$.
   C. There is a relative maximum at $x=0$, an absolute maximum at $x=8$, and an absolute minimum at $x=1$.
   D. There is a relative minimum at $x=3$ and at $x=0$, and an absolute maximum at $x=8$.
   ANSWER: C

2. At what x-values does the function $y=x^3-3x+1$ with domain $[-3,3]$ have relative minimums?
   A. -3 and 1
   B. -1 and 3
   C. 1 and 0
   D. 0 and 3
   ANSWER: A

3. Locate and classify all extrema (i.e., list whether each extremum is a local or absolute maximum or minimum). Also locate any stationary points or singular points that are not local extrema.
   ANSWER:
   Local maximum of 2 at $x=-3$
   Stationary point at $(-2,0)$
   Local minimum of 1 at $x=2$



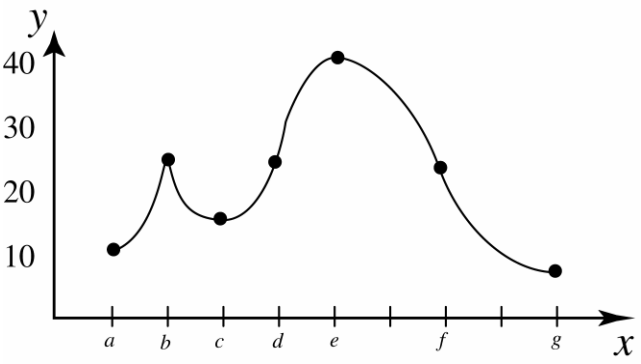
4. Find the exact location of all the local and absolute extrema for the function, $f(x)=\dfrac{e^{x^2-1}}{x}$, $x\neq 0$
   ANSWER:
   Local maximum of $\sqrt{2}\,e^{-0.5}$ at $x=\frac{\sqrt{2}}{2}$ and
   Local minimum of $-\sqrt{2}\,e^{-0.5}$ at $x=-\frac{\sqrt{2}}{2}$

5. An open rectangular box is to be constructed by cutting square corners out of out of a 16-inch piece of cardboard and folding up the flaps. Find the length of the square corner for which the volume of the box will be as large as large as possible.
   A. $\frac{3}{2}$ in
   B. $\frac{13}{10}$ in
   C. $\frac{8}{3}$ in
   D. $\frac{3}{4}$ in
   ANSWER: C

6. A model rocket is launched vertically upward so that its distance (in feet) above the ground at any time t (in seconds) is given by $s(t) = -16t^2 + 480t$. Determine the maximum height of the rocket and the amount of time it takes to reach this height.

A. 9120 feet in 30 seconds
B. 3200 feet in 10 seconds
C. 3600 feet in 15 seconds
D. 3200 feet in 20 seconds
ANSWER: C

USE THE FOLLOWING GRAPH TO ANSWER QUESTIONS 7 – 8.



7. Which, if any, of the x values exhibit an inflection point?
A. $x = b$ B. $x = d$ C. $x = f$ D. $x = d$ and $x = f$
ANSWER: D

8. Which of the following is/are true?
A. The graph is concave down over the interval $[b, d]$.
B. The graph is concave down over the interval $[d, f]$.
C. $f'(b) = 0$.
D. $f'(d) = 0$.
ANSWER: B

9. The graph of the function $f(x) = -2x^2 + 12x - 1$ is concave up:
A. when $x > 0$.
B. when $x < 0$
C. for all values of x
D. for no values of x
ANSWER: D

10. The point of inflection for the graph of $f(x) = x^3 - 3x^2 - 24x + 10$ is _____.
A. $(-1, 30)$ B. $(-1, 36)$ C. $(1, -20)$ D. $(1, -16)$
ANSWER: D

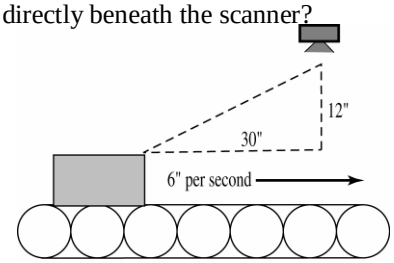
11. Prospector Pete is making pancakes. When he pours the batter from his bowl onto the hot grille, the pancake is circular and increasing at the rate of 4 cm per second. Determine the approximate rate of change in pancake area when the radius is 2 cm.

A. 50 cm^2/sec
B. 25 cm^2/sec
C. 35 cm^2/sec
D. 10 cm^2/sec
ANSWER: A

12. A box is moving along a conveyor belt in a post office distribution center. The box is moving at the rate of 6 inches per second toward a device that will scan the bar code. The top of the box is 12 inches below the scanner At approximately what rate is the distance between the container and the scanner changing when the container is 30 inches from a point directly beneath the scanner?

A. 5.31 in/sec
B. 1.28 in/sec
C. 8.67 in/sec
D. 2.79 in / sec

ANSWER: D



13. If elasticity of demand, $E = 0.5$, then which of the following is true?

A. A change in price will result in large changes in demand.
B. A change in price will result in an equal change in demand.
C. The demand for this product is elastic.
D. A change in price will result in relatively small changes in demand.

ANSWER: D

14. If the demand equation is $q = 80 - 2p$ for $0 \le p \le 40$, then the elasticity of demand E is:

A. $\frac{p^2}{p-40}$ B. $\frac{p}{40-p}$ C. $\frac{p}{20-p}$ D. $\frac{2p}{p-40}$

ANSWER: B

15. The demand for tickets to a YWCA fund raiser is given by $x = 100\sqrt{225-p}$, where $0 \le p \le 225$, where x is the number of tickets and p is the price for a single ticket. What should the ticket be priced at in order to maximize the revenue?

A. \$150 B. \$100 C. \$230 D. \$176

ANSWER: A

16. The daily demand for snow cones at a county fair is given by $q = 3000 - 750p$, where $0.75 \le p \le 2.50$. Find the range of prices for which demand is inelastic.

A. $.75 \le p \le 1.50$ B. $.75 \le p \le 1.75$
C. $.75 \le p \le 2.00$ D. $.75 \le p \le 2.25$

ANSWER: C

17. Given that weekly sales of morel mushrooms is given by $q = 1000 - 20p$, where q equals the number of pounds of mushrooms sold per week and p represents price per pound, calculate the elasticity of demand for a price of \$22 per pound. Also calculate the price that gives the maximum weekly revenue, and find this maximum revenue.

ANSWER: $E = \frac{11}{14.}$ The demand is going down at 11% per 14% increase in price at that price level. Revenue is maximized when price per pound is \$25. Maximum weekly revenue at that price is \$12500**.**

Bonus Questions—4 points each (all or nothing)

1. Suppose a farmer wishes to fence off a rectangular plot along the edge of a river (having a fairly straight bank). Fencing for the east and west sides of the plot will cost \$12 per foot, while fencing across the south side will cost \$15 per foot. The farmer has \$3,600 for the project. What is the largest area he can enclose?
   ANSWER: East and west sides = 75 feet and south side 120 feet.

2. The number of sunfish in a farm pond is related to the level of herbicide runoff into the pond. The sunfish population is modeled after the function $F(x) = \frac{2,600}{1+x}$, where x represents herbicide level in parts per million (ppm), and F represents number of fish. If the level of herbicide is increasing at a rate of 2 ppm/year, find the rate at which F is changing when there are 600 fish in the pond.

   A. –41 fish/year
   B. –170 fish/year
   C. –249 fish/year
   D. –277 fish/year
   ANSWER: D