Calculus Applications

96. Use the **first** and **second derivative** to identify the **local max and min**, **inflection point/s** determine the intervals where the curve is **concave up** and **concave down**. Then **graph** t function. **(DO NOT USE A GRAPHING CALCULATOR).**

$f(x) = x^3 - 3x^2 - 9x + 27$

Local Max_____

Local Min_____

Pt. of Inflection_____

Interval/s:

Concave Up_____

Concave Down_____

Calculus Applications

Answers

96. Local Max=(-1,32)
Local Min= (3,0)
Point of inflection=(1,16)
Concave Up: $(1,\infty)$
Concave Down: $(-\infty,1)$

Calculus Applications

97. A ball is thrown upward from the top of an 80 ft building so that its height in feet above the ground after t seconds is $h(t) = 80 + 64t - 16t^2$.

a. What is the instantaneous velocity at $t = 1$ second?

b. When is the velocity = 0?

c. What is the ball's maximum height above the ground?

d. When does the ball hit the ground?

e. For what values of t is the ball falling?

Use derivatives to solve.

98. The number 120 is divided into two parts such that the product of one number times the square of the other is a maximum. Determine the two numbers.

99. 800 yards of fencing is used to enclose a rectangular field with a fence down the middle parallel to one of the sides. What is the maximum area which can be enclosed?

100. A cardboard poster is to have 50 square inches of printed material surrounded by a 2" border at the top, 2" at the bottom and 1" on each side. Find the minimum dimensions of the poster which has a minimum area.

101. An open square-base box is to be manufactured from the least amount of material. If the box is to have a volume of 32 cubic meters, what dimensions will minimize the amount of material used?

Calculus Applications

Answers

97a. 32 **97b.** 2 sec. **97c.** 144 ft

97d. 5 sec. **97e.** $2 < t < 5$

98. 80 and 40 **99.** $26{,}666\frac{2}{3}$ yds^2

100. 7 inches x 14 inches **101.** 4 x 4 x 2