Math 1325 Test 3 Review
Name_____

Topics
Understand the properties of elasticity.
Be able to find a derivative.

Find the indicated absolute extremum as well as all values of x where it occurs on the specified domain.

1) $f(x) = \frac{1}{3}x^3 - 2x^2 + 3x - 4$; $[-2, 5]$

Minimum

2) $f(x) = x^2e^{-0.25x}$; $[3,10]$

Maximum

Find the absolute extrema if they exist as well as where they occur.

3) $f(x) = -3x^4 + 20x^3 - 36x^2 + 8$ 3) _____

4) $f(x) = 5 - x - 4/x$, $x > 0$

5) $f(x) = 4x \ln x$

Solve the problem.

6) If the price charged for a candy bar is p(x) cents, then x thousand candy bars will be sold in a certain city, where $p(x) = 94 - \frac{x}{36}$. How many candy bars must be sold to maximize revenue?

7) If the price charged for a bolt is p cents, then x thousand bolts will be sold in a certain hardware store, where $p = 46 - \frac{x}{32}$. How many bolts must be sold to maximize revenue?

8) Find the elasticity of demand E for the demand function $q = 40{,}000 - 10p^2$

9) The demand for ground chuck (hamburger) in a certain region of the United States is given by $q = 1.74p^{-0.23}$. Is the demand for ground chuck elastic or inelastic?

10) The demand equation for a certain product is $3p^2 + q^2 = 1{,}700$, where p is the price per unit in dollars and q is the number of units demanded. Find dq/dp.

11) The demand for boneless chicken breast, in dollars per pound, is given by $q = -0.7p + 6$, where p represents the price per pound and q represents the average number of pounds purchased per week per customer. Determine the price at which the demand for boneless chicken breast is unit elastic.

Find dy/dx by implicit differentiation.

12) $x^3 + y^3 = 5$

13) $x^{1/3} - y^{1/3} = 1$

14) $y^3e^x + x = y^4x$

15) $x \ln y + y = x^6y^6$

Find the equation of the tangent line at the given point on the curve.

16) $x^2 + y^2 + 2y = 0$; $(0, -2)$

Find the equation of the tangent line at the given value of x on the curve.

17) $y\sqrt{x + 1} = 4$, $x = 3$

Assume x and y are functions of t. Evaluate dy/dt.

18) $xy^2 = 4$; $dx/dt = -5$, $x = 4$, $y = 1$

19) $y\sqrt{x + 1} = 12$; $dx/dt = 8$, $x = 15$, $y = 3$

20) $x^2 \ln y = 2 + xe^y$; $dx/dt = 5$, $x = 4$, $y = 1$

Solve the problem.

21) A company knows that unit cost C and unit revenue R from the production and sale of x units are related by $C = \frac{R^2}{270{,}000} + 5{,}743$. Find the rate of change of revenue per unit when the cost per unit is changing by \$14 and the revenue is \$4,000.

22) Given the revenue and cost functions $R = 28x - 0.4x^2$ and $C = 8x + 12$, where x is the daily production, find the rate of change of profit with respect to time when 15 units are produced and the rate of change of production is 5 units per day.

1) $-\frac{62}{3}$ at $x = -2$

2) 8.6615 at $x = 8$

3) Absolute maximum of 8 at $x = 0$; no absolute minima

4) Absolute maximum of 1 at $x = 2$; no absolute minimum

5) Absolute minimum of 1.4715 at $x = e^{-1}$; no absolute maximum

6) 1,692 thousand candy bars

7) 736 thousand bolts

8) $E = \frac{2p^2}{4{,}000 - p^2}$

9) Inelastic

10) $dq/dp = -3p/q$

11) $4.29 per pound

12) $-\frac{x^2}{y^2}$

13) $\left(\frac{y}{x}\right)^{2/3}$

14) $\frac{dy}{dx} = \frac{y^4 - y^3e^x - 1}{3y^2e^x - 4xy^3}$

15) $\frac{dy}{dx} = \frac{6x^5y^7 - y \ln y}{x - 6x^6y^6 + y}$

16) $y = -2$

17) $y = -\frac{1}{4}x + \frac{11}{4}$

18) $\frac{5}{8}$

19) $-\frac{3}{4}$

20) $\frac{5e}{4(4 - e)}$

21) $472.50

22) $40.00 per day