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/m160.fa07/handouts160/RevProbs/1Set/1Set826

- 1 Let $f(x) = \frac{Ax + B}{Cx + D}$, where A , B , C , and D are constants. Find formulas for the following:

(a) $f^{-1}(x)$ (b) $f(x^{-1})$ (c) $f(x)^{-1}$

- 2 Here's a calculator-graphing problem:

Make a graph of f , where

$$f(x) = (1 - \ln(x))(e^x - 1)$$

for $1 \leq x \leq 3$. Sketch your calculator graph on paper. Label the following points on the sketch with their x - and y -coordinates (two-decimal accuracy):

- (a) Left endpoint (d) Rightmost x -intercept.
(b) Right endpoint (e) Maximum point
(c) Leftmost x -intercept (f) Minimum point

- 3 Miss Smith has a choice of bank accounts in which to deposit her **\$2500** lottery windfall. They all pay an APR of **8%**. She aims to make her deposit, then leave the account alone for three years. How much will she have at the end of the three years in an account that pays **8%**,

- (a) Compounded Annually? (c) Compounded Monthly?
(b) Compounded Quarterly? (d) Compounded Continuously?

- 4 Jones has found a bank that pays 7% annual interest, compounded monthly.

- (a) Suppose Jones makes 4 successive monthly \$100 deposits in an account at this bank. What is the total value of the four deposits immediately after the last deposit?
(b) How large a single deposit should Jones make now in another account at this bank in order to have it build to \$5000 in two years?

- 5 If $g(x) = \frac{e^x - e^{-x}}{2}$, then $g(\ln(2)) = ?$

6 Given the table

x	y
2	3
-4	5

find formulas for the following functions.

- (a) A straight-line function f .
 - (b) An exponential function g .
 - (c) Circle C has its center at the first point of the table. The second point lies on C .
 - (d) The graph of h is a parabola with vertex at the first point of the table. The second point lies on the parabola.
 - (e) The x -intercepts of circle C .
 - (f) The y -intercepts of circle C .
 - (g) The x -intercepts of the graph of h .
 - (h) The solutions of $h(x) = 0$.
 - (i) A formula for g^{-1} .
 - (j) In terms of base-ten logarithms, the half-life of g .
- 7 Write the difference quotient for $f(x) = \ln(x)$ as the natural logarithm of some quotient.
- 8 The function $f(x) = 5x^2 - 30x - 80$ does not have an inverse, right?
The function g , given by $g(x) = 5x^2 - 30x - 80$ for $x \leq 3$, does have an inverse, however. Find a formula for $g^{-1}(x)$.
- 9 If $f(x) = e^x + 4$, and $g(x) = \ln(1 - e^{2x})$, then $(f \circ g)(x) = ?$
- 10 If $f(x) = 8^x$ and $g(x) = \log_2(x)$, find $(f \circ g)(x)$

- 11** Otto has the Ada-county Veeblefetzter franchise. Veeblefetzters are copy protected so that a Veeblefetzter purchased from a franchise in some other county will not fetz in Ada county. This means that Ada-county residents who want a Veeblefetzter have to buy it from Otto.

Otto has the following demand data (x is the weekly sales of Veeblefetzters in Ada county at unit price p):

p	x
50	30
70	24

Question A: Write two equations: one expressing x in terms of p and one expressing p in terms of x . Assume that demand is linear.

Question B: Write two formulas for the weekly revenue R , one expressing R in terms of p and one expressing R in terms of x .

Otto also has the following data on the weekly total manufacturing cost C as it relates to the number x produced and sold each week:

x	C
9	1080
30	1500

Question C: Write formulas for C in terms of x and for C in terms of p . Assume, in each case, that C depends linearly on the independent variable.

Question D: Now write two formulas for the weekly profit P , one expressing P in terms of p and one expressing P in terms of x .

Each of these profit formulas will indicate how to attain the maximum profit. One will give the unit price at which total weekly profit is largest, while the other will yield a number of Veeblefetzters to be made and sold in order to attain a maximum profit.

Question E: Find the maximum profit and describe how it may be attained.

12 A table of functions and inverses:

Function	Inverse
$f(x) = \frac{3}{5}x - \frac{7}{10}$	$f^{-1}(x) =$
$f(x) = 3 + 2\sqrt{4 - 5x}$	$f^{-1}(x) =$
$f(x) =$	$f^{-1}(x) = \frac{4 - e^{(x-3)/2}}{5}$
$f(x) = 3 + \frac{2}{4 - 5x}$	$f^{-1}(x) =$
$f(x) = \frac{2 - 3x}{6x - 7}$	$f^{-1}(x) =$
$f(x) =$	$f^{-1}(x) = 125 \left(1 + \frac{3}{x}\right)^3$