PROBLEMS AND SOLUTIONS - COMBINING FUNCTIONS
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PLEASE NOTE THAT YOU CANNOT ALWAYS USE A CALCULATOR ON THE ACCUPLACER - COLLEGE-LEVEL MATHEMATICS TEST! YOU MUST BE ABLE TO DO SOME PROBLEMS WITHOUT A CALCULATOR!

Problem 1:

Given two functions $h(x) = x^2 + 3$ and $k(x) = 2x - 1$, find the following:

a. $(h + k)(x)$
b. $(h - k)(x)$
c. $(h \cdot k)(x)$
d. $(h \div k)(x)$
e. $(h \circ k)(x) = h[k(x)]$
f. $(k \circ h)(x) = k[h(x)]$

Problem 2:

Given two functions $f(x) = \sqrt{4 - x}$ and $g(x) = x - 3$, find the following:

a. $(f \circ g)(x) = f[g(x)]$
b. $(g \circ f)(x) = g[f(x)]$

Problem 3:

Given two functions $f(x) = 3x - 2$ and $g(x) = \frac{1}{3}x + \frac{2}{3}$, find the following:

a. $(f \circ g)(x) = f[g(x)]$
b. $(g \circ f)(x) = g[f(x)]$
c. $(f \circ f)(x) = f[f(x)]$
d. $(g \circ g)(x) = g[g(x)]$

Problem 4:

The number n of cars produced by some factory in one day after t hours of operation is given by $n = 1000\,t - 10t^2$. If the cost C in dollars of producing n cars is $C(n) = 16000 + 400n$, find the cost C as a function of the time t of operating the factory.

Problem 5:

The price p of some product and the quantity x sold obey the (demand) equation $p = -x + 30$ and the cost C of producing x units is $C = \dfrac{x^2 + 12000}{20}$. Find the cost C as a function of the price p.

Problem 6:

The surface area S of a spherical hot-air balloon is given by $S(r) = 4\pi r^2$, where r is the radius of the balloon. If the radius r increases with time t (in seconds) according to the formula $r = \frac{1}{2}t^3$, find the surface area S of the balloon as a function of the time t.

SOLUTIONS

You can find detailed solutions below the link for this problem set!

1. $h + k)(x) = x^2 + 2x + 2$ $(h - k)(x) = x^2 - 2x + 4$ $(h \cdot k)(x) = 2x^3 - x^2 + 6x - 3$ $\left(\frac{h}{k}\right)(x) = \frac{x^2 + 3}{2x - 1}$ $h(2x - 1) = 4x^2 - 4x + 4$ $k(x^2 + 3) = 2x^2 + 5$	2. $(f \circ g)(x) = \sqrt{7 - x}$ $(g \circ f)(x) = \sqrt{4 - x} - 3$	3. $(f \circ g)(x) = x$ $(g \circ f)(x) = x$ $(f \circ f)(x) = 9x - 8$ $(g \circ g)(x) = \frac{1}{9}x + \frac{8}{9}$
4. $C(t) = 16000 + 400000t - 4000t^2$	5. $C(p) = \frac{1}{20}p^2 - 3p + 645$	6. $S(t) = \pi t^6$