Math 32 Discussion Problems

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Practice and Review

1. Find all real solutions to the following equations:
   (a) $x^2(x^2-7)+12=0$ (b) $1+\sqrt{2-x}-\sqrt{5-2x}=0$ (c) $|3x-1|=4$
2. (a) Find the sum and product of the roots of the equation $2x^2+8x-9=0$.
   (b) Find a quadratic equation whose roots sum to 7 and multiply to 12.
   (c) Find a quadratic equation with integer coefficients and roots $2\pm3\sqrt{7}$.
3. Solve the inequality:
$$\frac{1}{x}+\frac{1}{x+1}+\frac{1}{x+2}\geq 0$$
4. Find the values of k for which the roots of the equation $x^2+4x+k^2=0$ are real.
5. Find the domain and range of the function $f(x)=\sqrt{x^2-3x-6}$. Hint: graph it.
6. Find the domain and range of the function $g(x)=(2x-8)/(3x+5)$. Hint: graph it.
7. Describe the graph of
$$y=f(x)=\frac{ax+b}{cx+d}$$
where a, b, c, and d are fixed constants. What are the intercepts and asymptotes? By reflecting the graph, find the inverse function $f^{-1}(x)$. Now solve for the inverse function algebraically, and check that your two answers agree.
8. Graph the function $y=-|x-3|+1$. Specify all intercepts.
9. Give an example of two functions $f(x)$ and $g(x)$ so that $f(g(x))=x$ for every real number x, but $g(f(x))$ does not always equal x. (The function g is called a "right inverse" of f, since it's like an inverse function — the composition of f with g is the identity function — but only when g is on the right. The function f is a "left inverse" of g.) Now keep the same function $f(x)$ and find a different $g(x)$ that is also a right inverse but not a left inverse.
10. Graph the function $y=-x^2+7x+6$. Label all intercepts, the axis of symmetry, the coordinates of the turning point, and any fixed points (solutions to $y(x)=x$).
11. The price of a new machine is $\$12,000$. After two years, the machine has a resale value of $\$10,500$. Assuming linear depreciation, find a formula for the value of the machine after t years, where $0\leq t\leq 2$. Assuming the depreciation will continue linearly, when will the machine be worthless?
12. It costs a particular computer company \$700 to build each laptop. If they sell each laptop at price P, then $2000-P/4$ people will buy a laptop. What price will maximize the company's profit?