## Answer on Question #83136 – Math – Calculus

## Question

3. Let $f$ and $h$ be functions, defined on $R$ by
$f(x) = x^3 - 3x^2 - 4x + 12$ and
$h(x) = \{f(x)/(x - 3)$, for $x$ not equal to 3,
$\{k$ for $x = 3$.

**(i)** Find all the roots of $f(x) = 0$.

**(ii)** Find the value of $k$ that makes $h$ continuous at $x = 3$.

**(iii)** Using the value of $k$ found in (ii) above, determine if $h$ is an even function or not.

**Solution**

**(i)** Note that $x = 3$ is a root of $f(x) = 0$. Using this, and factorizing $f(x)$, we have
$f(x) = x^3 - 3x^2 - 4x + 12 = (x - 3)(x - 2)(x + 2)$.
**Answer:** the roots of $f(x) = 0$ are 3, 2, and $-2$.

**(ii)** Using the previous result, we have $h(x) = f(x)/(x - 3) = x^2 - 4$ for $x$ not equal to 3. By continuity, this function extends to $x = 3$ with the result $h(3) = 3^2 - 4 = 5$.
**Answer:** $k = 5$.

**(iii)** The constructed continuous function $h(x) = x^2 - 4$ is obviously even.
**Answer:** it is even.