DM HOMEWORK 5

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Problem 1.
$\frac{x^8+x^4-2x^2+6}{x^4+2x^2+3} + 2x^2 - 2 = x^4$
x^4 can't be prime, sorry :'(

Problem 2.
Mistake is that we took as free variable k in both numbers (n and m). Difference between odd and even number is not always 1.

Problem 3.
$\frac{1}{2} + 8(n^2(2n^2+3)+1) - \frac{\cos 2n}{2} + \frac{1}{1+\tan^2 n} =$
$16n^4 + 24n^2 + 8 + \sin^2 n + \cos^2 n = 16n^4 + 24n^2 + 9 = (4n^2+3)^2$

Problem 4.
$r =$ is rational if p and $q \neq 0$ are integers. Multiplication and addition of integers produce integers. That's why $10m+15n$ and $4n$ are integers. That's mean, that $\frac{10m+15n}{4n}$ is rational by definition.

Problem 5.
$x^2 + bx + c = 0$
$d = b^2 - 4c$
$x_{12} = \frac{-b \pm \sqrt{d}}{2}$
If x_1 is rational then $-b + \sqrt{d}$ is integer and if $-b + \sqrt{d}$ is integer then $-b - \sqrt{d}$ is also integer or vise verse. And that's mean that x_2 is also rational.

Problem 6.
Let $r_i = \frac{p_i}{q_i}$. Just multiply first equation by $q_3 q_2 q_1 q_0$ and get integer numbers instead of rational.

Problem 7.
Lets do some magic and we will get that $\frac{1}{a} = \frac{1}{x} + \frac{1}{y}$
$\frac{1}{b} = \frac{1}{x} + \frac{1}{z}$
$\frac{1}{c} = \frac{1}{y} + \frac{1}{z}$
$x = 1/(\frac{1}{2a} + \frac{1}{2b} - \frac{1}{2c})$ x is rational.

Problem 9.
Just move condition from while(condition) loop to for(;condition;) loop. And do same thing with body of the loop.