Possible answers to the Algebra Review Task

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I. 1. 44 2. 90 3. 285 4. 7/2 or 3.5 5. -18/17 6. 4 There are degrees in the function and in the argument of the function. 7. $\frac{4\sqrt{3}}{3} - 7$ 8. (Since the Arcsin was capitalized and it was labeled f(x), I used the function and only have 1 answer.) $-4\pi/3 - 5$ And it does matter whether you are in radians or degrees, but since 5 has no units, we must use radians.

II. 1. $3x = 11$ $x = 11/3$ 2. $x + 4 = 5$ $x = 1$ The order of operations is different. In problem #1, we subtract 4 first, in problem #2, we divide by 3 first.

And, yes, to solve #2, we could have distributed the 3(x + 4) first.

3. $3\log_6 x = 6$
$\log_6 x = 2$
$x = 6^2 = 36$

4. $\log_6(x + 9) = 5$
$6^5 = x + 9$
$x = 6^5 - 9 = 7767$

The order of operations is different. In #3, we subtracted 9 first, but in #2, we divided by 3 first.

5. $3\cos x = 3 - \pi/3$
$\cos x = (3 - \pi/3)/3$
.86198, 5.4212

6. $\cos(x + \pi/3) = 1$
$x + \pi/3 = 0 + 2\pi k$
$x = -\pi/3 + 2\pi k$
$5\pi/3$

I don't know where $\cos x = 1 + \pi/9$, so we need a calculator for #5.

All these problems are alike because they show that parentheses change the order of operations.

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7. $x = f^{-1}\left(\frac{y - c}{a}\right)$ 8. $x = f^{-1}\left(\frac{y}{a}\right) - c$

III. 1. $x(x-9) = 0$ so $x = 0$ or $x = 9$ They are the same equation but in different forms.

1'. $x(4x-1) = 0$ so $x = 0$ or $x = \frac{1}{4}$ Don't divide by x or you lose an answer.

2. $(x-3)(x+3) = 0$ so $x = 3$ or $x = -3$ They are the same equation but in different forms.

2'. $(2x-1)(2x+1) = 0$ so $x = \frac{1}{2}$ or $x = -\frac{1}{2}$ If you square root both sides, don't forget the ±.

3. $(\sin x)(2\sin x - 1) = 0$ so $\sin x = 0$ or $\sin x = \frac{1}{2}$ so $x \in \{0, \pi, \pi/6, 5\pi/6\}$

4. $(2\sin^2 x=1)$ so $\sin^2 x = \frac{1}{2}$ so $\sin x = \frac{\pm\sqrt{2}}{2}$ so $x \in \{\pi/4, 3\pi/4, 5\pi/4, 7\pi/4\}$

5. $(x-4)(x-1) = 0$ so $x = 4$ or $x = 1$ They are the same equation but in different forms.

6. $x^2-5x+6 = 0 \Rightarrow (x-2)(x-3) = 0$, so $x = 2$ or $x = 3$ Set equation = 0, then factor if can…

7. Let $\frac{2x-5}{3} = k$. Then refer to #5, so $\frac{2x-5}{3} = 4 \Rightarrow 2x-5=12 \Rightarrow x=17/2$ or $\frac{2x-5}{3} = 1 \Rightarrow 2x-5=3 \Rightarrow x=4$

In quadratics, some expression is squared, but no higher power of the expression is found.

8. $(\csc x - 2)(\csc x + 1)=0$, so $\csc x=2$ or $\csc x =1$, so $\sin x = \frac{1}{2}$ or $\sin x = 1$ $x \in \{\pi/6, 5\pi/6, \pi/2\}$ Yes, this can be checked by graphing by finding zeros of the original function.

9. $(2\cos x - 1)(\cos x - 1) \Rightarrow \cos x = \frac{1}{2}$ or $\cos x = 1$, so $x \in \{\pi/3, 5\pi/3, 0\}$

10. $x^2-6x+10 = 0 \Rightarrow x = \frac{6 \pm \sqrt{36-40}}{2} = \frac{6 \pm 2i}{2} = 3 \pm i$ Use the quadratic formula.

11. $4\tan^2 x - 2\tan x - 5 = 0 \Rightarrow \tan x = \frac{2 \pm \sqrt{4+80}}{8} = \frac{1 \pm \sqrt{21}}{4}$, so $x \in \{.9491, 4.091, 2.411, 5.553\}$

12. $x = 5$ or $x = 3/2$ Yes they are the same.

13. $2x^2 - 13x + 15 = 6 \Rightarrow 2x^2 - 13x + 9 = 0 \Rightarrow x = \frac{13 \pm \sqrt{169-72}}{4} = \frac{13 \pm \sqrt{97}}{4}$

14. $3\sin^2 x - 5\sin x + 2 = 2 \Rightarrow 3\sin^2 x - 5\sin x = 0 \Rightarrow (\sin x)(3\sin x - 5) = 0 \Rightarrow \sin x = 0$ or ~~$\sin x = 5/3$~~, so $x = \pi$

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IV. 1. $x = \frac{1}{7}$ multiplication property of equality or definition of multiplication/division

2. $x = \frac{29}{7}$ 3. $x = \frac{41}{7}$ 4. $x = \frac{69}{14}$ 5. $x = \frac{-14}{3}$ 6. Sin $x = \frac{1}{2}$ so $x \in \{\pi/6, 5\pi/6\}$

7. A) $\sec x = 2 \Rightarrow \cos x = \frac{1}{2}$, so $x \in \{\pi/3, 5\pi/3\}$ B) Graph y1=3sec x and y2=6 and find $\cap$. C) Graph y1=3sec x – 6 and look for zeros. D) Just solve sec x = 2.

8. $x = \frac{2y-5}{y+6} \Rightarrow xy + 6x = 2y - 5 \Rightarrow xy - 2y = -6x - 5 \Rightarrow y(x-2) = -6x - 5 \Rightarrow y = \frac{-6x-5}{x-2}$

*** Compare and contrast this to the inverse of $\begin{bmatrix} 2 & -5 \\ 1 & 6 \end{bmatrix}$.

V. 1. Yes No Yes 2. Yes No Yes

3. Always Any angle except 0° + 360°k or 90° + 360°k

Look at unit circle or graphically you find this is true when x = 360°k or x = 90° + 360°k

cos x = sin(90° - x) or $\cos x = \pm\sqrt{1-\sin^2 x}$

4. Yes No 5. You must square or take the square root of both entire sides of an equation. You can't square or take the square root term by term.

6. There are 2 variables 7. Write $\cos^2 x$ as $1 - \sin^2 x$

8. $1 - \sin^2 x + \sin x = 1 \Rightarrow -\sin^2 x + \sin x = 0 \Rightarrow (-\sin x)(\sin x - 1) = 0 \Rightarrow \sin x = 0$ or $\sin x = 1$ so $x \in \{0. \Pi, \pi/2\}$

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9. No No No No 10. Only multiplication/division distribute over addition/subtraction.

11. Period is 1/3 as long. Amplitude is 4 times higher. There are 1/3 as many $\cap$s.

Take the arccos of both sides and use + 2πk to get the general term, then restrict values.

$\cos 3x = -\frac{1}{2} \Rightarrow 3x = \pm 120° + 360°k \Rightarrow x = \pm 40° + 120°k$ or $x = \pm\pi/9 + 2\pi/3k$

VI. 1. No No No No Yes Yes No No Yes 2. Only factors "cancel", so factor first. 3. Yes No We add with common denominators not common numerators.

4. Yes No