ALGEBRA AND TRIGONOMETRY WARMUP

1. Simplify. Look for common factors which can be cancelled.

$$(\frac{t^2-t-6}{t^2+t-2})(\frac{t^2+4t-5}{t^2+6t+5})$$

2. Write as a single expression. (Find a common denomenator.)

(a) $3^{(-1/2)} - 2/\sqrt{6} + \sqrt{12}$

(b) $\sqrt{5x/8} - \sqrt{2x/5}$

3. Simplify. (Write as a simple fraction.)

(a) $\dfrac{x+y}{x^{-1}-y^{-1}}$

(b) $\dfrac{x+y}{x^{-1}+y^{-1}}$

(c) $\dfrac{x/y-2+y/x}{x/y-y/x}$

Verify the equalities in exercises 4 through 8.

4. $\dfrac{1+2\,x}{\sqrt{6+x^2}} - \dfrac{x\,(-2+x+x^2)}{(6+x^2)^{\frac{3}{2}}} = \dfrac{6+14\,x+x^3}{(6+x^2)^{\frac{3}{2}}}.$

5. $\dfrac{\sqrt{x^2+6}(2x+1)-(x^2+x-2)(x)(x^2+6)^{-1/2}}{x^2+6} = \dfrac{6+14\,x+x^3}{(6+x^2)^{\frac{3}{2}}}.$

6. $\left(\dfrac{\sqrt{x+h}-\sqrt{x}}{h}\right)\left(\dfrac{\sqrt{x+h}+\sqrt{x}}{\sqrt{x+h}+\sqrt{x}}\right) = \dfrac{1}{\sqrt{x+h}+\sqrt{x}}$

7. $\dfrac{1+2\,x}{6+x^2} - \dfrac{2\,x\,(-2+x+x^2)}{(6+x^2)^2} = \dfrac{6+16\,x-x^2}{(6+x^2)^2}$

8. $2\sqrt{-5+x}\,x + \dfrac{x^2}{2\sqrt{-5+x}} = \dfrac{5\,(-4+x)\,x}{2\sqrt{-5+x}}.$

9. Find an equation for the line which passes through $(2,5)$ and has slope equal to -4.

10. Find an equation for the line which passes through (a,b) and has slope equal to $-2a/b$.

11. Find an equation satisfied by the pair (a,b) if the line in the previous exercise passes through the point $(0,3)$.

12. Let $f(x) = \cos x^2$. What is $f(2.5)$? What is $f(y)$? What is $f(x+h)$?

13. Let $f(x) = \sqrt{x}$. What is $f(2.5)$? What is $f(y)$? What is $f(x+h)$?

14. What is wrong with these "calculations"? (You will probably have a lot of trouble following the steps, since they are nonsense, but these are genuine examples of common student errors. Try to figure out what the authors of the errors had in mind.)

(a) $\dfrac{\cos(x^2)}{x} = \cos(x).$

(b) $\dfrac{3x(1+x)^2 + 5x}{1+x} = 3x(1+x) + 5x = 3x^2 + 8x.$

(c) $\dfrac{\sqrt{a^2+b^2}}{a+b} = 1.$

15. Solve for y: $x = \dfrac{y-6}{y+3}.$

16. Solve for y: $y - 6 + \sqrt{y} = 0$

17. Describe the set of solutions (in each case an interval or union of intervals.)

(a) $\left|\dfrac{2x-3}{4}\right| \leq 3$

(b) $x^2 - 3x + 2 \geq 0$

(c) $x^2 - 3x + 2 \leq 0$

(d) $(x^2 - 3x + 2)(4 - x) \leq 0$

18. Graph: $y = (x^2 - 3x + 2)(4 - x).$