Solve the equations.

1. $8 - \frac{5}{x} = 2 + \frac{3}{x}$

$6 = \frac{8}{x}$

$\frac{6x}{6} = \frac{8}{6}$

$\boxed{x = \frac{4}{3}}$

2. $(3x-2)^2 = (x-5)(9x+4)$

$9x^2 - 12x + 4 = 9x^2 - 41x - 20$

$\frac{29x}{29} = \frac{-24}{29}$

$\boxed{x = \frac{-24}{29}}$

3. $\sqrt[5]{2x^2 + 1} - 2 = 0$

$\left(\sqrt[5]{2x^2+1}\right)^5 = (2)^5$

$2x^2 + 1 = 32$

$\frac{2x^2}{2} = \frac{31}{2}$ $x^2 = \frac{31}{2}$; $x = \pm\sqrt{\frac{31}{2}}$;

$\boxed{x = \pm\frac{\sqrt{62}}{2}}$

4. $6x^2 + x - 12 = 0$

$(2x+3)(3x-4) = 0$

$\boxed{x = -\frac{3}{2}}$ $\boxed{x = \frac{4}{3}}$

5. $x^2 + 6x + 7 = 0$

$x^2 + 6x + 9 = -7 + 9$

$\sqrt{(x+3)^2} = \sqrt{2}$

$x + 3 = \pm\sqrt{2}$

$\boxed{x = -3 \pm \sqrt{2}}$

Write the expression in the form of a+bi.

6. $(1-3i)(2+5i)$

$2 - i - 15i^2$

$\boxed{17 - i}$

7. $\frac{3}{2+4i} \cdot \frac{2-4i}{2-4i} = \frac{6-12i}{4+16}$

$= \frac{6-12i}{20} = \boxed{\frac{3-6i}{10}}$

Solve the inequality and express the solutions in terms of intervals when possible.

8. $-2 - 3x \geq 2$

$\frac{-3x}{-3} \geq \frac{4}{-3}$

$x \leq -\frac{4}{3}$

$\boxed{\left(-\infty, -\frac{4}{3}\right]}$

9. $3 \leq \frac{2x-3}{5} < 7$

$15 \leq 2x - 3 < 35$

$\frac{18}{2} \leq \frac{2x}{2} < \frac{38}{2}$

$9 \leq x < 19$ $\boxed{[9, 19)}$