

Practice Day 21

I Solve for x :

a) $\sqrt{2x - 5} = 1 + \sqrt{x - 3}$ b) $\frac{5}{3x + 2} = \frac{3}{2x} - 1$

II Simplify:

a) $\frac{-5 + 9i}{1 - 2i}$ b) $\frac{4\sqrt{6} - 3\sqrt{10}}{\sqrt{6} - 2\sqrt{10}}$

III Given $f(x) = \frac{2x}{1+x}$.

a) Find $f\left(\frac{1}{3}\right)$ B) Find $\frac{f(x+h) - f(x)}{h}$

IV Rosita can wax her car in 2 hours. When she works together with Helga, they can wax the car in 45 minutes. Helga will start waxing the car by herself at 3:30 p.m. What time will she finish?

V Solve for x . Graph solution on number line:

$$|x + 1| - x + |1 - x| = 6$$

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I

$$A) \sqrt{2x-5} = 1 + \sqrt{x-3}$$

$$2x-5 = 1 + 2\sqrt{x-3} + x-3$$

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

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

$$x^2 - 6x + 9 = 4(x-3)$$

$$= 4x - 12$$

$$x^2 - 10x + 21 = 0$$

$$(x-7)(x-3) = 0$$

$$x=7 \quad x=3$$

$$x=7$$

$$\sqrt{9} = 1 + \sqrt{4}$$

OK

$$x=3 \quad \sqrt{1} = 1 + 0$$

OK

$$x \in \{7, 3\}$$

III

$$f(x) = \frac{2x}{1+x}$$

$$A) f\left(\frac{1}{3}\right) = \frac{2 \cdot \frac{1}{3}}{1 + \frac{1}{3}}$$

$$\frac{\frac{2}{3}}{\frac{4}{3}}$$

$$\frac{1}{2}$$

$$B) f(x+h) = \frac{2x+2h}{1+x+h}$$

$$\frac{1}{h} \left(\frac{2x+2h}{1+x+h} - \frac{2x}{1+x} \right)$$

$$\frac{1}{h} \left(\frac{(2x+2h)(1+x) - (2x)(1+x+h)}{(1+x+h)(1+x)} \right)$$

$$B) \left(\frac{5}{3x+2} > \frac{3}{2x} - 1 \right) 2x(3x+2)$$

$$10x = 9x+6 - 6x^2 - 4x$$

$$6x^2 + 5x - 6 = 0$$

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

$$x = \frac{2}{3} \quad x = -\frac{3}{2} \quad \text{Both OK}$$

II

$$A) \frac{-5+9i}{1-2i} \cdot \frac{1+2i}{1+2i}$$

$$\frac{-5+9i}{-18-10i}$$

$$\frac{-23}{5} - \frac{1}{5}i$$

$$B) \frac{4\sqrt{6} - 3\sqrt{10}}{\sqrt{6} - 2\sqrt{10}} \cdot \frac{\sqrt{6} + 2\sqrt{10}}{\sqrt{6} + 2\sqrt{10}}$$

$$\frac{24 - 8\sqrt{60}}{6 - 3\sqrt{60}} - \frac{5\sqrt{60}}{4-15}$$

$$\frac{-36 + 10\sqrt{15}}{6 - 40}$$

$$\frac{-34}{-17 + 5\sqrt{15}}$$

$$\frac{-17}{17 - 5\sqrt{15}}$$

$$\frac{17}{17}$$

$$\frac{17 - 5\sqrt{15}}{17}$$

$$\frac{2}{(1+x+h)(1+x)}$$

IV Let $h = \text{helga's hrs}$

$$\left(\frac{1}{h} \cdot \frac{3}{4} + \frac{1}{2} \cdot \frac{3}{4} = 1 \right) 8h$$

$$6 + 3h = 8h$$

$$6 = 5h$$

$$\frac{6}{5} = h$$

$\frac{1}{5}$ hr 12 min.

Helga will finish
at 4:42 pm

D $|x+1| - x + |1-x| = 6$

if $x < -1$

$$-(x+1) - x + 1 - x = 6$$

$$-x-1-x+1-x=6$$

$$-3x = 6$$

$$x = -2$$

$x > 1$

$$x+1-x+1-x=6$$

$$x = 6$$

$$\begin{array}{c} 0 \qquad 0 \\ | \quad | \\ -1 \quad 1 \end{array}$$

$-1 \leq x < 1$

$$x+1-x+1-x=6$$

$$2-x=6$$

$$-4=x$$

reject.

$$x \in \{-2, 6\}$$

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