

Aim: How do we prepare for the college placement exam(LIU)?

Get Ready: Begin Placement Practice Exam

1. Divide $\frac{25b^2 - 36}{b^2 + 4ab + 4a^2}$ by $\frac{5b+6}{2a+b}$

$$\frac{25b^2 - 36}{b^2 + 4ab + 4a^2} \cdot \frac{2a+b}{5b+6}$$

$$= \frac{(5b+6)(5b-6)(2a+b)}{(b+2a)(b+2a)(5b+6)} \cdot \frac{5b+6}{b+2a}$$

$$= \frac{5b-6}{b+2a}$$

2. Divide $x^5 + 32$ by $x+2 = \frac{(x+2)(x^4 - 2x^3 + 4x^2 - 8x + 16)}{x+2}$

$$\begin{array}{r} x^5 \quad x^4 \quad x^3 \quad x^2 \quad x \quad \# \\ -2 \quad | \quad 1 \quad 0 \quad 0 \quad 0 \quad 0 \quad +32 \\ \quad \quad -2 \quad 4 \quad -8 \quad 16 \quad -32 \\ \hline \quad \quad 1 \quad -2 \quad 4 \quad -8 \quad 16 \quad 0 \end{array}$$

$$\boxed{-x^4 - 2x^3 + 4x^2 - 8x + 16}$$

3. Write $\frac{5-2i}{3+2i}$ in $a+bi$ form. RATIONALIZE USING CONJUGATE

$$\frac{5-2i}{3+2i} \cdot \frac{3-2i}{3-2i} = \frac{15-6i-10i+4i^2}{9+6i-6i-4i^2} = \frac{15-16i-4}{9+4}$$

$$= \frac{11-16i}{13}$$

$$= \frac{11}{13} - \frac{16}{13}i$$

$$\boxed{i^2 = -1}$$

4. Solve for x & y. $\begin{cases} 3x+8y=5 \\ x-4y=6 \end{cases}$

$$\begin{array}{r} 3x+8y=5 \\ -3x+12y=-18 \\ \hline 20y=-13 \\ y = -\frac{13}{20} \end{array}$$

$$\begin{array}{r} x-4\left(-\frac{13}{20}\right)=6 \\ x+\frac{52}{20}=6 \\ x+\frac{13}{5}=6 \\ x+\frac{13}{5}=\frac{30}{5} \\ x=\frac{17}{5} \end{array}$$

$$5. \frac{3}{x^2-4} = \frac{2}{x+2} + \frac{5}{x-2}$$

$$\frac{3}{(x+2)(x-2)} = \left(\frac{2}{x+2} + \frac{5}{x-2}\right) \frac{(x+2)(x-2)}{(x+2)(x-2)}$$

$$3 = 2(x-2) + 5(x+2)$$

$$3 = 2x - 4 + 5x + 10$$

$$3 = 7x + 6$$

$$-3 = 7x$$

$$\boxed{-\frac{3}{7} = x}$$

6. $\sqrt{2x+2} - \sqrt{x+2} = 1$

$$\sqrt{2x+2} = \sqrt{x+2} + 1$$

$$(\sqrt{2x+2})^2 = (\sqrt{x+2} + 1)^2$$

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

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

$$(x-1)^2 = (2\sqrt{x+2})^2$$

$$x^2 - 2x + 1 = 4(x+2)$$

$$x^2 - 2x + 1 = 4x + 8$$

$$7. \log_4 x = -\frac{3}{2}$$

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

$$\frac{1}{4^{\frac{3}{2}}} = x$$

$$\boxed{\frac{1}{8} = x}$$

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

$$\begin{cases} x^2 - 6x - 7 = 0 \\ (x-7)(x+1) = 0 \\ x = 7 \quad x = -1 \end{cases}$$

$$\sqrt{2(7)+2} - \sqrt{7+2} = 1$$

$$4 - 3 = 1 \checkmark$$

$$\sqrt{2(-1)+2} - \sqrt{-1+2}$$

$$0 - 1 \neq 1 \checkmark$$

$$4^{\frac{3}{2}} = (\sqrt{4})^3 = 2^3 = 8$$

OR

$$= \sqrt{4^3} = \sqrt{64} = 8$$

8. Factor out the GCF: $3x^4y^3 - 15x^3y^3 - 18x^2y^5$

$$\boxed{= 3x^2y^3(x^2 - 5x - 6y^2)}$$

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9. Simplify

$$\frac{\frac{a}{2b} - \frac{2b}{a}}{\frac{1}{b^2} - \frac{1}{2a}} = \frac{a^2 - 4b^2}{2ab}$$

$$\frac{\frac{a^2 - 4b^2}{2ab}}{\frac{2a - b^2}{2ab^2}} = \frac{a^2 - 4b^2}{2ab} \cdot \frac{2ab^2}{2a - b^2}$$

$$= \frac{(a^2 - 4b^2)b}{2a - b^2}$$

Bottom

$$\frac{1}{b^2} - \frac{1}{2a} = \frac{2a - b^2}{2ab^2}$$

10. Compute:

a. $\cos \frac{5\pi}{4}$ b. $\tan \frac{7\pi}{4}$ c. $\sin 3\pi$ d. $\cot \frac{2\pi}{3}$

$= \cos 225^\circ = -\frac{\sqrt{2}}{2}$ $= \tan 315^\circ = -1$ $3\pi = 540^\circ = \cot 120^\circ = -\frac{1}{\sqrt{3}}$

QIII QIV QII

$\cos \theta < 0$ $\tan \theta < 0$ $\cot \theta > 0$

Ref $\alpha = 45^\circ$ Ref $\alpha = 45^\circ$ Ref $\alpha = 60^\circ$

$= -\cos 45^\circ = -\frac{\sqrt{2}}{2}$ $= -\tan 45^\circ = -1$ $= \cot 60^\circ = \frac{1}{\sqrt{3}}$

$\cos 45^\circ = \sin 45^\circ = \frac{\sqrt{2}}{2}$ $\tan 45^\circ = \frac{\sin 45^\circ}{\cos 45^\circ} = 1$ $= \frac{1}{-\sqrt{2}} = -\frac{\sqrt{2}}{2}$

11. Find the length and midpoint of a line segment whose endpoints are (-2,5) and (-4,7)

MIDPOINT "AVERAGE"

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$= \left(\frac{-2 + (-4)}{2}, \frac{5 + 7}{2} \right)$$

$$= (-3, 6)$$

A.P.

Distance (length) "Pyth theorem"

$$d^2 = (\Delta y)^2 + (\Delta x)^2$$

$$d^2 = (y_2 - y_1)^2 + (x_2 - x_1)^2$$

$$d^2 = (7 - 5)^2 + (-4 - (-2))^2$$

$$d^2 = (2)^2 + (-2)^2$$

$$d^2 = 8$$

$$d = \sqrt{8} = \sqrt{4 \cdot 2} = 2\sqrt{2}$$

12. The perimeter of a rectangle is 228 ft. The width is 42 feet less than the length. Find the dimensions.

$$x + x + x - 42 + x - 42 = 228$$

$$4x - 84 = 228$$

$$4x = 312$$

$$x = 77.25$$

13. Rationalize the denominator:

$$\frac{2\sqrt{5} - 3\sqrt{2}}{2\sqrt{5} + 3\sqrt{2}} \cdot \frac{2\sqrt{5} - 3\sqrt{2}}{2\sqrt{5} - 3\sqrt{2}} = \frac{38 - 12\sqrt{10}}{2} = \frac{38}{2} - \frac{12\sqrt{10}}{2} = 19 - 6\sqrt{10}$$

14. Simplify:

$$\frac{(2x^2y^{-2})^9}{3x^8y^7} = \frac{2^9 x^{18} y^{-18}}{3^9 x^{72} y^{63}} = \frac{512 x^{18} y^{-18}}{19683 x^{72} y^{63}} = \frac{512}{19683 x^{54} y^{81}}$$

$$\frac{p^{\frac{3}{4}} q^{\frac{2}{3}}}{p^{\frac{7}{8}} q^{\frac{3}{4}}} = \left(\frac{p^{\frac{3}{4}} q^{\frac{2}{3}}}{p^{\frac{7}{8}} q^{\frac{3}{4}}} \right)^2 = \left(p^{\frac{3}{4} - \frac{7}{8}} q^{\frac{2}{3} - \frac{3}{4}} \right)^2 = \left(p^{-\frac{1}{8}} q^{-\frac{1}{12}} \right)^2 = \frac{1}{p^{\frac{1}{4}} q^{\frac{1}{6}}}$$

$$\frac{3}{4} - \frac{7}{8} = \frac{6}{8} - \frac{7}{8} = -\frac{1}{8}$$

$$\frac{2}{3} - \frac{3}{4} = \frac{8}{12} - \frac{9}{12} = -\frac{1}{12}$$