099 Practice Final Solutions

① $\sqrt{94500}$

$= \sqrt{2^2 \cdot 3^3 \cdot 5^3 \cdot 7}$

$= \sqrt{2^2 \cdot 3^{2+1} \cdot 5^{2+1} \cdot 7}$

$= \sqrt{2^2 \cdot 3^2 \cdot 3^1 \cdot 5^2 \cdot 5^1 \cdot 7}$

$= 2^{\frac{2}{2}} \cdot 3^{\frac{2}{2}} \cdot 5^{\frac{2}{2}} \sqrt{3 \cdot 5 \cdot 7}$

$= 2 \cdot 3 \cdot 5 \sqrt{105} = \boxed{30\sqrt{105}}$

2	94500
2	47250
3	23625
3	7875
3	2625
5	875
5	175
5	35
	7

2	108
2	54
3	27
3	9
	3

② $\sqrt{\dfrac{108 x^2 y^{-3}}{x^5 z^{-5}}}$

when we see odd powers under the square root, we must assume the variables are nonnegative. when $x \geq 0$, then $|x| = x$, so we don't sweat the absolute values, here.

Scratch: $108 = 2^2 \cdot 3^3$

$= 2^2 \cdot 3^2 \cdot 3$

$x^{2-5} y^{-3} z^5 = x^{-3} y^{-3} z^5$

$= \dfrac{z^5}{x^3 y^3} = \dfrac{z^4 \cdot z}{x^2 \cdot x \cdot y^2 \cdot y}$

$= \sqrt{\dfrac{2^2 \cdot 3^2 \cdot 3 \cdot z^4 \cdot z}{x^2 \cdot y^2 \cdot x \cdot y}} = \dfrac{2 \cdot 3 \cdot z^2}{x y} \sqrt{\dfrac{3z}{xy}}$

$= \boxed{\dfrac{6z^2}{xy} \sqrt{\dfrac{3z}{xy}}}$

3	81
3	27
3	9
	3

③ $\sqrt{x^2} = |x|$, ④ $\sqrt{(x-5)^2} = |x-5|$ ⑤ $(81)^{\frac{1}{4}}$

$= (3^4)^{\frac{1}{4}}$

$= 3^{(4)(\frac{1}{4})} = \boxed{3}$

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(6) $x^2-2x-35=0$ in 3 methods

(a) $(x-7)(x+5)=0 \Rightarrow$ **$x=7$ OR $x=-5$**

(b) $x^2-2x = 35$

$x^2-2x+1^2 = 35+1^2$

$(x-1)^2 = 36$

$|x-1| = \sqrt{36} = 6$

$x-1=6$ OR $x-1=-6$

$x=7$ OR $x=-5$

(c) $a=1, b=-2, c=-35$

$b^2-4ac = (-2)^2-4(1)(-35)$

$=4+140=144$

$x = \dfrac{-b\pm\sqrt{b^2-4ac}}{2a}$

$= \dfrac{-(-2)\pm\sqrt{144}}{2(1)}$

$= \dfrac{2\pm12}{2} = \dfrac{2(1\pm6)}{2}$

$=1\pm6 \rightarrow$ **$x=7$ OR $x=-5$**

(7) The discriminant of $x^2-2x-35=0$ is

$b^2-4ac = (-2)^2-4(1)(-35)$

$=$ **144**

$(a=1, b=-2, c=-35)$

(8) $x^2-5x+7=0$

$x^2-5x = -7$

$x^2-5x+\left(\frac{5}{2}\right)^2 = -7+\left(\frac{5}{2}\right)^2$

$\left(x-\frac{5}{2}\right)^2 = -\frac{3}{4}$

$x-\frac{5}{2} = \pm\sqrt{-\frac{3}{4}} = \pm i\sqrt{\frac{3}{4}} = \pm i\frac{\sqrt{3}}{\sqrt{4}} = \pm\frac{i\sqrt{3}}{2}$

$x = \frac{5}{2}\pm\frac{i\sqrt{3}}{2} = \frac{5\pm i\sqrt{3}}{2} \rightarrow$ **$x=\frac{5+i\sqrt{3}}{2}$ OR $\frac{5-i\sqrt{3}}{2}$**

SCRATCH:

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

$= -7+\frac{25}{4}$

$= -\frac{7}{1}\cdot\frac{4}{4}+\frac{25}{4}$

$= \frac{-28+25}{4} = -\frac{3}{4}$

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(8) Done with quadratic formula

$x^2 - 5x + 7 = 0$

$a = 1, b = -5, c = 7$

$b^2 - 4ac = (-5)^2 - 4(1)(7)$

$= 25 - 28 = -3$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{5 \pm \sqrt{-3}}{2} = \frac{5 \pm i\sqrt{3}}{2}$$

$$x = \frac{5 + i\sqrt{3}}{2} \text{ OR } x = \frac{5 - i\sqrt{3}}{2}$$

#s 9 – 18 SEE TEST 5

#s 19 – 22 SEE TEST 4

ALL THE REST, just backtrack thru the other test keys I posted on the website.