8-27-19 1st Try

① $(2s^{-1}t^3u^{-4}d)^{-2}$

$\left(\frac{2t^3d}{su^4}\right)^{-1\cdot 2}$

$\left(\frac{su^4}{2t^3d}\right)^2$

$\frac{su^4}{2t^3d}\cdot\frac{su^4}{2t^3d}=\frac{s^2u^8}{4t^6d^2}$

② $\frac{9\pm\sqrt{18}}{3}=$ $\frac{\overset{3}{\cancel{9}}\pm\overset{1}{\cancel{3}}\sqrt{2}}{\underset{1}{\cancel{3}}}$

$3\pm\sqrt{2}$

③ $(7^3)^3$

$7^3\cdot 7^7\cdot 7^3$

$777\ 777\ 777$

7^9

④ $(5^3\cdot 5^4)^3$

$(5\cdot5\cdot5\cdot 5\cdot5\cdot5\cdot5)^3$

$(5^7)^3$

$5^7\cdot 5^7\cdot 5^7=5^{21}$

(5) What is the 198th digit in $.\overline{12768}$ (7)

5th 10th 15

.12768|12768|12768|12768...

195
200
205
210

(6) Which digit is in the 298th spot of $.\overline{123}$ (1)

.123|123|123|123|123

3rd 6 9 12 15

247th 298th

$\frac{298}{3} = 99.\overline{3}$

99 sets of 3

$99 \times 3 = 297$

(7) $\sqrt[4]{160}$

160

16 10

4 4

2 2 2 2 2 5

$2\sqrt[4]{2\cdot2\cdot2\cdot2\cdot2\cdot5}$

$2\sqrt[4]{10}$

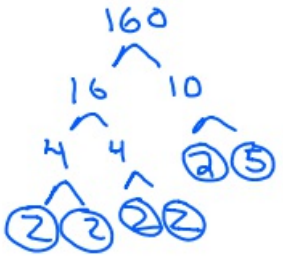
8-27-19 3rd Try

① $\frac{9 \pm \sqrt{18}}{3}$

$\frac{9 \pm 3\sqrt{2}}{3}$

$3 \pm \sqrt{2}$

② $\sqrt[4]{160}$



$2\sqrt[4]{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 5}$

$2\sqrt[4]{10}$

③ $(12^3 \cdot 12^2)^3$

$(12 \cdot 12 \cdot 12 \cdot 12 \cdot 12)^3$

$(12^5)^3$

$12^5 \cdot 12^5 \cdot 12^5 = 12^{15}$

④ What digit is in the 197th spot in $.\overline{12649}$?

.12649 12649 12649 12649 ...

5th 10th 15th 20th

196th 200th 205th

2

$\frac{197}{5} = 39.4$

$\begin{array}{r} 39 \\ \times\ 5 \\ \hline 195 \end{array}$

⑤ Which digit is in the 185^{th} spot of $.\overline{2378}$

.2378237823782378237823782378...

184

$\frac{185}{4} = 46\,25$

$46 \times 4 = 184$

⑥ $(a^3b^2c)(a^4b^3c^2)$

aaabbc aaaabbbcc

$a^7b^5c^3$

⑦ $2n^2y + 3ny^2 + 4ny^2 + 6n^2y$

$8n^2y + 7ny^2$

⑧ $(4n^2)^2 \cdot 2ny + (2n^2y)^2$

$4n^2 \cdot 4n^2 \cdot 2ny + 2n^2y \cdot 2n^2y$

4 nn 4 nn 2 ny

$32n^5y + 4n^4y^2$

8-27-19 4th Trig

① $\frac{9 \pm \sqrt{18}}{3} = \frac{\cancel{9}^{3} \pm \cancel{3}^{1}\sqrt{2}}{\cancel{3}_{1}}$

$18 = \sqrt{2 \cdot 3 \cdot 3}$

$= 3 \pm \sqrt{2}$

② $\sqrt[4]{160}$

160
16 10
8 2 5 2
4 2
2 2

$2\sqrt[4]{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 5}$

$2\sqrt[4]{10}$

③ $\left(12^{4} \cdot 12^{2}\right)^{2}$

$(12 \cdot 12 \cdot 12 \cdot 12 \cdot 12 \cdot 12)^{2}$

$(12^{6})^{2}$

$12^{6} \cdot 12^{6} = 12^{12}$

④ Which digit is in the 197th spot of $.\overline{23741}$?

3

.237412374123741237412374123741...

5th 10th 15th 20th

195th 200th

$\frac{197}{5} = 39.4$

$\begin{array}{r} 39 \\ \times\ 5 \\ \hline 195 \end{array}$

(4) Which digit is in the 151st spot of $.\overline{1234}$? (3)

.1234 1234 1234 1234 .. ! 2 3 4

4th 8th 12th ... 148 151

$\frac{151}{4} = 37.75$

$37 \times 4 = 148$

(6) $(a^2b^3c)(ab^3c)$

$aa\ bbb\ c\ a\ bbb\ c$

$a^3b^6c^2$

(7) $a^2b + 3ab^2 + 5ab^2 + 6a^2b$

$7a^2b + 8ab^2$

(8) $(3n^2y)^2 \cdot ny + 6n^5 \cdot 2y^4$

$3n^2y \cdot 3n^2y \cdot ny + 12n^5y^4$

$9n^5y^3 + 12n^5y^4$