1. $\left((3x-1)^{\frac{1}{5}}\right)^5 = (2)^5$

$3x-1=32$

$x=11$

2. $\dfrac{5(73)+5(x)}{10}=81$

$365+5x=810$

$x=89$

3. Given: $P(x)=ax^3+bx^2+cx+d$

Since $P(0)=-24,\ d=-24$.

The product of the roots is 24, so $-\dfrac{d}{a}=24$, and so $a=1$.

The sum of the roots is -5, so $-\dfrac{b}{a}=-5 \quad\rightarrow\quad b=5a$, and so $b=5$.

The sum of the product of the roots ,taken two at a time, is $(-3)(-4)+(-3)(2)+(-4)(2)=-2$, so $\dfrac{c}{a}=-2$, and $c=-2$.

$P(x)=x^3+5x^2-2x-24$.

$P(-1)=-18$

4. $AC=\begin{bmatrix}1 & 5\\ 5 & 6\end{bmatrix}\begin{bmatrix}1 & 1\\ -5 & 5\end{bmatrix}=\begin{bmatrix}-24 & 26\\ -25 & 35\end{bmatrix}$

$CB=\begin{bmatrix}1 & 1\\ -5 & 5\end{bmatrix}\begin{bmatrix}-5 & 6\\ 0 & 5\end{bmatrix}=\begin{bmatrix}-5 & 11\\ 25 & -5\end{bmatrix}$

$AC-CB=\begin{bmatrix}-19 & 15\\ -50 & 41\end{bmatrix}$

$x+y=-35$

5. $\sum_{k=5}^{9}(2k+3)=13+15+17+19+21=85$

6. $x^2+4x+4=-8y-8$

$(x+2)^2=-8(y+1)$

The vertex is $(-2,-1)$, and the length of the latus rectum is $\dfrac{|-8|}{4}=2$. Because the parabola opens down, the focus is at $(-2,-3)$.

7. Using synthetic division, -1 divides through twice with no remainder.

8. $\log 4x+3(\log x-\log y)$

$\log 4x+3\log\dfrac{x}{y}$

$\log 4x+\log\dfrac{x^3}{y^3}$

$\log\dfrac{4x^4}{y^3}$

9. Multiply by 3 four more times, or just multiply by 81. $\dfrac{54}{5}(81)=\dfrac{4374}{5}$.

10. $(7i^2)(-8i)^2+(5i^5)(-4i)+\left(\dfrac{\sqrt{441}}{i^2}\right)\left(\dfrac{\sqrt{-9}}{i}\right)$

$(-7)(-64)+(5i)(-4i)+(-21)(3)$

$448+20-63$

405

11. The number of permutations of 3 people from a group of 7 is $\dfrac{7!}{4!}=210$.

12. Cost (c) varies inversely with people (p).

$c=\frac{k}{p}$. $26=\frac{k}{63}$, so $k=1638$.

$c=\frac{1638}{72}=22.75$

13. (-6,-3) and (-3,-10)

$m=\frac{-10-(-3)}{-3-(-6)}=-\frac{7}{3}$.

$y=mx+b$

$-10=-\frac{7}{3}(-3)+b$

$b=-17$

$\frac{b}{m}=\frac{51}{7}$.

14. $x=(1+3i)$

$x-1=3i$

$(x-1)^2=(3i)^2$

$x^2-2x+1=-9$

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

$2B+C=-4+10=6$

15. $5\sqrt{27}+6\sqrt{3}-4\sqrt{48}$

$15\sqrt{3}+6\sqrt{3}-16\sqrt{3}$

$5\sqrt{3}$

16. $g(f(-1))=g(9)=241$

17. $\frac{\frac{x^2-16x+64}{10x}}{\frac{x-8}{2x}}=\frac{(x-8)^2}{10x}\cdot\frac{2x}{x-8}=\frac{x-8}{5}$

18. $\frac{1}{9^{4x}}=27^{(8-2x)}$

$3^{-8x}=3^{24-6x}$

$-8x=24-6x$

$x=-12$

19. $(x-3)^2+(y+1)^2=16$

Finding where $y=0$:

$(x-3)^2+(1)^2=16$

$x^2-6x+9+1=16$

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

$x=3\pm\sqrt{15}$

$x=3+\sqrt{15}$

20. $(3x+5)(1x-2)$, and $BC=5$.

21. Using substitution, find the solution is the point $(-5,2,3)$, and $z-x=8$.

22. $3(2^{n-1})$

23. 59

24. $\frac{x-3}{4x}-\frac{-2x-2}{9}=-\frac{29}{36}$

$9x-27+8x^2-8x=-29x$

$8x^2+30x-27=0$

$\frac{-30\pm\sqrt{900-4(8)(-27)}}{16}$

$\frac{-30\pm 42}{16}$

$\frac{3}{4},-\frac{9}{2}$

The least is $-9/2$.

25. $\frac{2x-2}{x-25} \geq \frac{1}{x+5}$

25 and -5 are critical points.

Solving for additional critical points:
$2x^2+8x-10=x-25$

Testing the discriminant, there are no real solutions and no additional critical points. Testing intervals, the solution set is
$(-\infty,-5]\cup[25,\infty)$
The greatest integer not in the solution set is 24.