

pg 492
#12

$$\log_5(x-1) + \log_5(x-2) - \log_5(x+6) = 0$$

$$\log_5\left(\frac{(x-1)(x-2)}{(x+6)}\right) = 0$$

$$\log_5\left(\frac{(x-1)(x-2)}{(x+6)}\right) = 0$$

$$= \frac{(x-1)(x-2)}{x+6}$$

$$1 = \frac{(x-1)(x-2)}{(x+6)}$$

$$(x+6) = (x-1)(x-2)$$

$$x+6 = x^2 - 3x + 2$$

$$0 = x^2 - 4x - 4$$

$$x = \frac{+4 \pm \sqrt{16 - 4(-4)}}{2}$$
$$= \frac{+4 \pm \sqrt{32}}{2}$$

485 #1c

$$\begin{aligned} 9^{x+1} &= 27^{2x-3} \\ \left(3^2\right)^{x+1} &= \left(3^3\right)^{2x-3} \\ 3^{2x+2} &= 3^{6x-9} \\ 2x+2 &= 6x-9 \\ | &= 4x \\ \frac{1}{4} &= x \end{aligned}$$

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#15, #16

$$\log \left(\frac{x+y}{5} \right) = \frac{1}{2} (\log x + \log y)$$

$$\log \left(\frac{x+y}{5} \right) = \frac{1}{2} \log xy$$

$$\log \left(\frac{x+y}{5} \right) = \log (xy)^{1/2}$$

$$\frac{x+y}{5} = (xy)^{1/2}$$

$$\left(\frac{x+y}{5} \right)^2 = xy$$

$$\frac{x^2 + 2xy + y^2}{25} = xy$$

$$x^2 + 2xy + y^2 = 25xy$$

$$x^2 + y^2 = 23xy$$

~~114~~

$$\frac{\log(35-x^3)}{\log(5-x)} = 3$$

$$\log(35-x^3) = 3\log(5-x)$$

$$(35-x^3) = (5-x)^3$$

1.

$$2 \cos^3 x - \cos x = 0$$

$$\text{let } y = \cos x$$

$$2y^3 - y = 0$$

$$\cancel{y} (2y^2 - 1) = 0$$

$$y = 0$$
$$\cos x = 0$$

$$= \frac{\pi}{2}, \frac{3\pi}{2}, -\frac{\pi}{2}, -\frac{3\pi}{2}$$

*

$$\text{or } 2y^2 - 1 = 0$$
$$y = \pm \frac{1}{\sqrt{2}}$$

$$\cos \theta = \frac{1}{\sqrt{2}}$$
$$\theta = \frac{\pi}{4}, \frac{7\pi}{4}$$

~~12~~
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$$\begin{aligned}\sin\left(\frac{\pi}{12}\right) &= \sin\left(\frac{\overset{\downarrow \sqrt{13}}{4\pi}}{12} - \frac{\overset{\downarrow \sqrt{14}}{3\pi}}{12}\right) \\ &= \sin\left(\frac{\pi}{3}\right)\cos\left(\frac{\pi}{4}\right) - \frac{\cos\frac{\pi}{3}\sin\frac{\pi}{4}}{3 \cdot 4} \\ &= \frac{\sqrt{3}}{2}\left(\frac{1}{\sqrt{2}}\right) - \frac{1}{2}\left(\frac{1}{\sqrt{2}}\right) \\ &= \frac{\sqrt{3}}{2\sqrt{2}} - \frac{1}{2\sqrt{2}} \\ &= \frac{\sqrt{3}-1}{2\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} \\ &= \frac{\sqrt{6}-\sqrt{2}}{4}\end{aligned}$$

$$\tan\left(\frac{\pi}{8}\right) = \tan\left(2 \times \frac{\pi}{16}\right)$$

$$= \tan(2 \times \theta)$$

$$= \frac{2 \tan \theta}{1 - \tan^2 \theta}$$

$$= \frac{2 \tan \frac{\pi}{16}}{1 - (\tan \frac{\pi}{16})^2}$$

$$= \frac{2(0.19)}{1 - (0.19)^2}$$

$$=$$

$$12. \quad 2 \cot^2(2x) + 5 \csc(2x) - 1 = 0$$

$$\text{let } \frac{\theta}{2x} = \theta \quad \frac{5^2 + 1^2}{5^2} = \frac{1}{5^2} \quad \text{let } \csc \theta = y$$

$$1 + \cot^2 \theta = \csc^2 \theta$$

$$\cot^2 \theta = \csc^2 \theta - 1$$

$$2(\csc^2 \theta - 1) + 5 \csc \theta - 1 = 0$$

$$2y^2 - 2 + 5y - 1 = 0$$

$$2y^2 + 5y - 3 = 0$$

$$2y^2 + 6y - y - 3 = 0$$

$$2y(y+3) - 1(y+3) = 0$$

$$(2y-1)(y+3) = 0$$

$$2y - 1 = 0$$

$$y = \frac{1}{2}$$

$$\csc \theta = \frac{1}{2}$$

~~$$\sin \theta = \frac{2}{1}$$~~

$$\frac{0}{5}$$

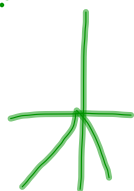
$$y + 3 = 0$$

$$y = -3$$

$$\csc \theta = -3$$

$$\sin \theta = -\frac{1}{3}$$

$$\theta = \sin^{-1}\left(-\frac{1}{3}\right)$$



$$= 0.07$$

$$\theta = 3.14 + 0.07$$

$$\theta = 6.28 - 0.07$$

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$$\log_{\frac{1}{3}} 27 = x$$

$$\frac{1}{3}^x = 27$$

$$(3^{-1})^x = 27$$

$$3^{-x} = 27$$

$$3^x = 3^3$$

$$\begin{aligned} -x &= 3 \\ x &= -3 \end{aligned}$$

f)

$$\log_{\frac{1}{2}} 2 = -2$$

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

$$(2^{-1})^{-2} = x$$

$$2^2 = x$$

$$4 = x$$

7.