- 1 a $ext{Maximum} = \sqrt{4^2 + 3^2} = 5$ $ext{Minimum} = -5$
 - $\begin{array}{ll} \textbf{b} & Maximum = \sqrt{3+1} = 2 \\ & Minimum = -2 \end{array}$
 - $\begin{array}{ll} \textbf{c} & \text{Maximum} = \sqrt{1+1} = \sqrt{2} \\ & \text{Minimum} = -\sqrt{2} \end{array}$
 - $\begin{array}{ll} \text{d} & \text{Maximum} = \sqrt{1+1} = \sqrt{2} \\ & \text{Minimum} = -\sqrt{2} \end{array}$
 - e Maximum = $\sqrt{9+3} = \sqrt{12} = 2\sqrt{3}$ Minimum = $-2\sqrt{3}$
 - $\begin{array}{ll} \textbf{f} & \ \, \text{Maximum} = \sqrt{1+3} = 2 \\ & \ \, \text{Minimum} = -2 \end{array}$
 - $\label{eq:gmaximum} \begin{array}{ll} \textbf{g} & \text{Maximum} = \sqrt{1+3}+2=4 \\ & \text{Minimum} = -\sqrt{1+3}+2=0 \end{array}$
 - $\begin{array}{ll} \textbf{h} & \text{Maximum} = 5 + \sqrt{3^2 + 2^2} \\ & = 5 + \sqrt{13} \\ & \text{Minimum} = 5 \sqrt{3^2 + 2^2} \\ & = 5 \sqrt{13} \end{array}$
- 2 a $r=\sqrt{1+1}=\sqrt{2}$ $\cos lpha=rac{1}{\sqrt{2}};\ \sin lpha=-rac{1}{\sqrt{2}}$ $lpha=-rac{\pi}{4}$
 - $\sqrt{2}\sin\left(x-rac{\pi}{4}
 ight)=1 \ \sin\left(x-rac{\pi}{4}
 ight)=rac{1}{\sqrt{2}} \ x-rac{\pi}{4}=rac{\pi}{4}, rac{3\pi}{4} \ x=rac{\pi}{2}, \pi$
 - b $r=\sqrt{3+1}=2$ $\coslpha=rac{\sqrt{3}}{2};\;\sinlpha=rac{1}{2}$ $lpha=rac{\pi}{6}$ $2\sin\left(x+rac{\pi}{6}
 ight)=1$
 - $\sin\!\left(x+rac{\pi}{6}
 ight)=rac{1}{2}
 onumber \ x+rac{\pi}{6}=rac{\pi}{6},\,rac{5\pi}{5},\,rac{7\pi}{6}
 onumber \ x=0,\,rac{2\pi}{2},\,2\pi$

$$egin{aligned} r &= \sqrt{3+1} = 2 \ \coslpha &= rac{1}{2}; \ \sinlpha &= -rac{\sqrt{3}}{2} \ lpha &= -rac{\pi}{3} \ 2\sin\left(x-rac{\pi}{3}
ight) &= -1 \end{aligned}$$

$$\sin\left(c-rac{\pi}{3}
ight)=-rac{1}{2}$$
 $x-rac{\pi}{3}=-rac{\pi}{6}, rac{7\pi}{6}$ $x=rac{\pi}{6}, rac{3\pi}{2}$

d
$$r = \sqrt{9+3} = \sqrt{12}$$

$$= 2\sqrt{3}$$

$$\cos \alpha = \frac{3}{2\sqrt{3}} = \frac{\sqrt{3}}{2}$$

$$\sin \alpha = \frac{\sqrt{3}}{2\sqrt{3}} = \frac{1}{2}$$

$$2\sqrt{3}\cos\left(x+rac{\pi}{6}
ight) = 3$$
 $\cos\left(x+rac{\pi}{6}
ight) = rac{3}{2\sqrt{3}} = rac{\sqrt{3}}{2}$ $x+rac{\pi}{6} = rac{\pi}{6}, rac{11\pi}{6}, rac{13\pi}{6}$ $x=0, rac{5\pi}{3}, 2\pi$

$$egin{aligned} r &= \sqrt{4^2 + 3^2} \ &= \sqrt{25} = 5 \ \cos lpha &= rac{4}{5}; \ \sin lpha &= rac{3}{5} \ lpha &pprox 36.87^\circ \end{aligned}$$

$$egin{aligned} 5\sin(heta+36.87)&pprox 5\ \sin(heta+36.87)&pprox 1\ heta+36.87&pprox 90^\circ\ heta&pprox 53.13^\circ \end{aligned}$$

$$egin{aligned} r &= \sqrt{8+4} = \sqrt{12} = 2\sqrt{3} \ \cos lpha &= rac{2\sqrt{2}}{2\sqrt{3}} = rac{\sqrt{2}}{\sqrt{3}} \ \sin lpha &= -rac{2}{2\sqrt{3}} = -rac{1}{\sqrt{3}} \ lpha &pprox -35.26^\circ \ 2\sqrt{3}\sin(heta - 35.26) pprox 3 \end{aligned}$$

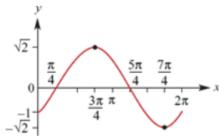
$$egin{align} egin{split} ar{3} \sin(heta - 35.26) &pprox 3 \ \sin(heta - 35.26) &pprox rac{3}{2\sqrt{3}} = rac{\sqrt{3}}{2} \ heta - 35.26 &pprox 60^\circ, 120^\circ \ heta &pprox 95.26^\circ, 155.26^\circ \end{split}$$

$$r=\sqrt{3+1}=2 \ \coslpha=rac{\sqrt{3}}{2};\ \sinlpha=rac{1}{2} \ lpha=rac{\pi}{6} \ 2\cos\left(2x+rac{\pi}{6}
ight)$$

$$r=\sqrt{1+1}=\sqrt{2}$$
 $\coslpha=-rac{1}{\sqrt{2}};\;\sinlpha=-rac{1}{\sqrt{2}}$ $lpha=rac{5\pi}{4}$ $\sqrt{2}\sinigg(3x-rac{5\pi}{4}igg)$

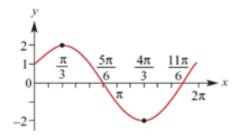
$$r=\sqrt{1+1}=\sqrt{2}$$
 $\coslpha=rac{1}{\sqrt{2}};\;\sinlpha=-rac{1}{\sqrt{2}}$
 $lpha=-rac{\pi}{4}$
 $f(x)=\sqrt{2}\sinigg(x-rac{\pi}{4}igg)$

The graph will have amplitude $\sqrt{2}$, period 2π , and be translated $\frac{\pi}{4}$ units right.



$$egin{aligned} r &= \sqrt{3+1} = 2 \ \coslpha &= rac{\sqrt{3}}{2}, \ \sinlpha &= rac{1}{2} \ lpha &= rac{\pi}{6} \ f(x) &= 2\sin\left(x+rac{\pi}{6}
ight) \end{aligned}$$

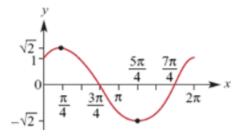
The graph will have amplitude 2, period 2π , and be translated $\frac{\pi}{6}$ units left.



$$r=\sqrt{1+1}=\sqrt{2} \ \coslpha=rac{1}{\sqrt{2}};\ \sinlpha=rac{1}{\sqrt{2}} \ lpha=rac{\pi}{4}$$

$$f(x) = \sqrt{2} \sin \! \left(x + rac{\pi}{4}
ight)$$

The graph will have amplitude $\sqrt{2}$, period 2π , and be translated $\frac{\pi}{4}$ units left.



d
$$r=\sqrt{1+3}=2$$

$$\coslpha=rac{1}{2};\ \sinlpha=-rac{\sqrt{3}}{2} \ lpha=-rac{\pi}{3}$$

$$f(x)=2\sin\!\left(x-rac{\pi}{3}
ight)$$

The graph will have amplitude 2, period 2π , and be translated $\frac{\pi}{3}$ units right.

