Arbeitsblatt Nr. Datum:

Name: Klasse: Fach:

Aufgabe 1.1:

a) Substitution: $2x-1=z$ $2x=z+1$ $x=0{,}5z+0{,}5$

$\cos(z)=-0{,}2$

$z_1=\arccos(-0{,}2)$ $z_1=1{,}77$ $x_1=0{,}5\cdot 1{,}77+0{,}5$ $x_1=1{,}39$

$z_2=2\pi-1{,}77$ $z_2=4{,}51$ $x_2=0{,}5\cdot 4{,}51+0{,}5$ $x_2=2{,}76$

$z_3=1{,}77-2\pi$ $z_3=-4{,}51$ $x_3=0{,}5\cdot(-4{,}51)+0{,}5$ $x_3=-1{,}76$

$z_4=4{,}51-2\pi$ $z_4=-1{,}77$ $x_4=0{,}5\cdot(-1{,}77)+0{,}5$ $x_4=-0{,}39$

b) Substitution: $\frac{1}{2}x+0{,}25=z$ $\frac{1}{2}x=z-0{,}25$ $x=2z-0{,}5$

$\sin(z)=0{,}8$

$z_1=\arcsin(0{,}8)$ $z_1=0{,}927$ $x_1=2\cdot 0{,}927-0{,}5$ $x_1=1{,}35$

$z_2=\pi-0{,}927$ $z_2=2{,}21$ $x_2=2\cdot 2{,}21-0{,}5$ $x_2=3{,}92$

c) $\sin(4x+7)=-0{,}3$

Substitution: $4x+7=z$ $4x=z-7$ $x=0{,}25z-1{,}75$

$z_{min}=4\cdot 4+7$ $z_{min}=23$

$z_{max}=4\cdot 7+7$ $z_{max}=35$

$23\le z\le 35$

$\sin(z)=-0{,}3$

$z_1=\arcsin(-0{,}3)$ $z_1=-0{,}305$

$z_2=\pi+0{,}305$ $z_2=3{,}45$

$z_3=-0{,}305+8\pi$ $z_3=24{,}8$ $x_1=0{,}25\cdot 24{,}8-1{,}75$ $x_1=4{,}45$

$z_4=3{,}45+8\pi$ $z_4=28{,}6$ $x_2=0{,}25\cdot 28{,}6-1{,}75$ $x_2=5{,}40$

$z_5=-3{,}05+10\pi$ $z_5=31{,}1$ $x_3=0{,}25\cdot 31{,}1-1{,}75$ $x_3=6{,}03$

$z_6=3{,}45+10\pi$ $z_4=34{,}9$ $x_4=0{,}25\cdot 34{,}9-1{,}75$ $x_4=6{,}98$

Arbeitsblatt Nr. Datum:

Name: Klasse: Fach:

d) $\cos\left(\frac{\pi}{3}x+\frac{\pi}{4}\right)=-\frac{1}{\sqrt{2}}$

Substitution: $\frac{\pi}{3}x+\frac{\pi}{4}=z$ $\frac{\pi}{3}x=z-\frac{\pi}{4}$ $x=\frac{3}{\pi}z-\frac{3}{4}$

$z_{min}=\frac{\pi}{3}\cdot(-5)+\frac{\pi}{4}$ $z_{min}=-\frac{17}{12}\pi$; $z_{min}=-4{,}45$

$z_{max}=\frac{\pi}{3}\cdot 1+\frac{\pi}{4}$ $z_{max}=\frac{7}{12}\pi$; $z_{max}=1{,}83$

$-4{,}45\le z\le 1{,}83$

$\cos(z)=-\frac{1}{\sqrt{2}}$; $\cos(z)=-0{,}707$

$z_1=\arccos\left(-\frac{1}{\sqrt{2}}\right)$ $z_1=2{,}36$

$z_2=-z_1$ $z_2=-2{,}36$ $x_1=\frac{3}{\pi}\cdot(-2{,}36)-\frac{3}{4}$ $x_1=-3{,}00$

$z_3=z_1-2\pi$ $z_3=-3{,}92$ $x_2=\frac{3}{\pi}\cdot(-3{,}92)-\frac{3}{4}$ $x_1=-4{,}49$

$z_4=z_2-2\pi$ $z_4=-8{,}64$

e) Substitution: $10x+0{,}3=z$ $10x=z-0{,}3$ $x=0{,}1z-0{,}03$

$z_{min}=10\cdot(-0{,}1)+0{,}3$ $z_{min}=-0{,}7$

$z_{max}=10\cdot 1+0{,}3$ $z_{max}=10{,}3$

$-0{,}7\le z\le 10{,}3$

$\sin(z)=-0{,}25$

$z_1=\arcsin(-0{,}25)$ $z_1=-0{,}253$ $x_1=0{,}1\cdot(-0{,}253)-0{,}03$ $x_1=-0{,}0553$

$z_2=\pi-z_1$ $z_2=3{,}39$ $x_2=0{,}1\cdot 3{,}39-0{,}03$ $x_2=0{,}309$

$z_3=z_1-2\pi$ $z_3=-6{,}54$

$z_4=z_2-2\pi$ $z_4=-2{,}89$

$z_5=z_1+2\pi$ $z_5=6{,}03$ $x_3=0{,}1\cdot 6{,}03-0{,}03$ $x_3=0{,}573$

$z_6=z_2+2\pi$ $z_6=9{,}67$ $x_4=0{,}1\cdot 9{,}67-0{,}03$ $x_4=0{,}937$

Arbeitsblatt Nr. Datum:

Name: Klasse: Fach:

f) Substitution: $100\pi \cdot x - 20 = z$ $100\pi \cdot x = z + 20$ $x = \frac{1}{100\pi} \cdot z + \frac{1}{5\pi}$

$z_{min} = 100\pi \cdot 0{,}2 - 20$ $z_{min} = 42{,}83$

$z_{max} = 100\pi \cdot 0{,}25 - 20$ $z_{max} = 58{,}54$

$42{,}83 \leq z \leq 58{,}54$

$\sin(z) = 0{,}4$

$z_1 = \arcsin(0{,}4)$ $z_1 = 0{,}412$

$z_2 = \pi - z_1$ $z_2 = 2{,}73$

$z_3 = z_1 + 14\pi$ $z_3 = 44{,}4$ $x_1 = \frac{1}{100\pi} \cdot 44{,}4 + \frac{1}{5\pi}$ $x_1 = 0{,}205$

$z_4 = z_2 + 14\pi$ $z_4 = 46{,}7$ $x_2 = \frac{1}{100\pi} \cdot 46{,}7 + \frac{1}{5\pi}$ $x_2 = 0{,}212$

$z_5 = z_1 + 16\pi$ $z_5 = 50{,}7$ $x_3 = \frac{1}{100\pi} \cdot 50{,}7 + \frac{1}{5\pi}$ $x_3 = 0{,}225$

$z_6 = z_2 + 16\pi$ $z_6 = 53{,}0$ $x_4 = \frac{1}{100\pi} \cdot 53{,}0 + \frac{1}{5\pi}$ $x_4 = 0{,}232$

$z_7 = z_1 + 18\pi$ $z_7 = 57{,}0$ $x_5 = \frac{1}{100\pi} \cdot 57{,}0 + \frac{1}{5\pi}$ $x_5 = 0{,}245$

$z_8 = z_2 + 18\pi$ $z_8 = 59{,}3$