Answer sheet 2

Sheet 5

Problem 14 $ae - bd \neq 0$, a) $\frac{7}{6}, -\frac{1}{9}$ b) $0, -2$ c) $\frac{7}{5}, \frac{4}{5}$.

Problem 15 $\begin{pmatrix} 2 & 3 \\ 4 & -3 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 2 \\ 5 \end{pmatrix}$, $\begin{pmatrix} 1 & -1 \\ 2 & -3 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 2 \\ 6 \end{pmatrix}$, $\begin{pmatrix} 3 & -4 \\ -1 & 3 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$.

Problem 17 a) $-\frac{17}{5}, -\frac{13}{5}$ b) $\frac{5}{17}, \frac{13}{17}$ c) $\frac{10}{9}, \frac{-16}{9}$ d) No solutions.

Sheet 6

Problem 18 $\begin{pmatrix} 2 \\ -17 \\ 7 \end{pmatrix}$.

Problem 19 $\begin{pmatrix} 2 \\ -1 \\ -3 \end{pmatrix}$, $\begin{pmatrix} 38 \\ -1 \\ -10 \\ 11 \end{pmatrix}$, $\begin{pmatrix} \frac{13}{9} \\ \frac{1}{9} \\ \frac{1}{3} \\ \frac{1}{3} \end{pmatrix}$.

Problem 20 $\begin{pmatrix} 5 \\ 1 \end{pmatrix}$, $\begin{pmatrix} 1 \\ 11 \end{pmatrix}$, $\begin{pmatrix} 14 \\ 10 \end{pmatrix}$,

Problem 21 11, 2, 3, -5, 0. Final product impossible.

Problem 22 $\begin{pmatrix} -4 & 8 \\ -6 & 14 \end{pmatrix}$, $\begin{pmatrix} 12 & 12 \\ 2 & 8 \end{pmatrix}$, $\begin{pmatrix} 3 & 7 \\ 2 & 1 \end{pmatrix}$, $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$, $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$, $\begin{pmatrix} -4 & -4 \\ 12 & 14 \end{pmatrix}$.
$AB \neq BA$ in general.

Problem 24 a) $\begin{pmatrix} 1 & -1 & 3 & 0 \\ 2 & 2 & 4 & 0 \\ -2 & 0 & 2 & 2 \end{pmatrix}$, b) $\begin{pmatrix} -1 & 3 \\ -2 & 6 \end{pmatrix}$, c) impossible, d) $\begin{pmatrix} 2 & 1 & 3 \\ 2 & -2 & 0 \end{pmatrix}$, e) impossible.

Problem 25 a) $\begin{pmatrix} 5 & -7 \\ -2 & 3 \end{pmatrix}$, b) $\begin{pmatrix} 5 & -3 \\ -3 & 2 \end{pmatrix}$, c) $\begin{pmatrix} \frac{7}{2} & -\frac{3}{2} \\ -2 & 1 \end{pmatrix}$, d) impossible, e) $\begin{pmatrix} \frac{3}{4} & -\frac{1}{4} & -\frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} & -\frac{1}{2} \\ -\frac{1}{4} & -\frac{1}{4} & \frac{1}{2} \end{pmatrix}$,
f) $\begin{pmatrix} 1 & \frac{1}{2} & \frac{1}{2} \\ 1 & 1 & 0 \\ 0 & \frac{1}{2} & \frac{1}{2} \end{pmatrix}$, g) $\begin{pmatrix} -2 & \frac{2}{3} & \frac{7}{6} & \frac{1}{2} \\ -1 & -\frac{1}{3} & \frac{7}{6} & \frac{1}{2} \\ 1 & 0 & -\frac{1}{2} & -\frac{1}{2} \\ 1 & 0 & -1 & 0 \end{pmatrix}$.

Sheet 7

Problem 26 ± 1.895, 0.

Problem 27 $\frac{1}{4}$, $\frac{3}{4}$, for example $x = \frac{16x^2+3}{16}$.

Problem 28 $a = 1.90$, $x_2 = 1.82$, $x_3 = 1.94...$

Problem 29 $x_1 = 0.8$, $x_2 = 0.8275$, $x_3 = 0.8723$, $x_4 = 0.9483$, $x_5 = 1.0868$. Will not converge to a root. At 0.2 iteration converges to 0.75 not 0.25.

Problem 30 a) ± 1.237 $\left(x = \dfrac{3x + 2\sin 2x}{4}\right)$, 0 $\left(x = \dfrac{4x - 2\sin 2x}{3}\right)$, b) 0.7236 $\left(x = \dfrac{10x - 2}{10x}\right)$, 0.2764 $\left(x = \dfrac{10x^2 + 2}{10}\right)$, c) 0.7391 $(x = \cos x)$, d) -2.9122 $\left(x = \dfrac{-2x^2 + 3x + 1}{x^2}\right)$, -0.2865 $\left(x = \dfrac{x^3 + 2x^2 - 1}{3}\right)$, 1.1987 $\left(x = \dfrac{x^3 + 2x^2 - 9x - 1}{-6}\right)$, e) 1.247 $\left(x = 1 + \dfrac{x^2 \cos x}{2}\right)$.

Sheet 8

Problem 31 a) $3x^2 + 6x + 1$, b) $4x^3 + 2x$, c) $\dfrac{-2}{(x-1)^2}$, d) $2x\cos(x^2)$, e) $2x\cos(x) - x^2\sin(x)$, f) $\ln(x^2+1) + \dfrac{2x^2}{x^2+1}$, g) $\dfrac{1}{\cos(x)^2}$.

Problem 32 a) $y = 15x - 9$, b) $y = 10x - 7$, c) $y = -\dfrac{x}{2} + \dfrac{3}{2}$, d) $y = x$, e) $y = \ln(2)x$, f) $y = (e+1)x - 2$.

Problem 33 1, 1.114729, 1.114157, etc.

Problem 34 a) -4.278, b) 0, ± 0.9477, c) ± 0.7226, d) 1.753.