1 Differentiation

Differentiate the following expressions:

$$-8 - \frac{9}{x^8} \tag{1}$$

$$\tan\left(\sin\left(\cot\left(x\right)\right)\right) \tag{2}$$

$$\cos\left(\frac{1}{\ln\left(x\right)^3}\right) \tag{3}$$

$$\tan\left(\ln\left(\frac{1}{x}\right)\right) \tag{4}$$

$$\ln\left(\ln\left(\frac{1}{x}\right)\right) \tag{5}$$

$$\tan\left(\cos\left(\cot\left(x\right)\right)\right) \tag{6}$$

$$\ln\left(e^{-8x}\right) \tag{7}$$

$$\frac{1}{4x - 20} \tag{8}$$

$$e^{-4\tan\left(x\right)} \tag{9}$$

$$\csc\left(e^{\frac{1}{x}}\right) \tag{10}$$

$$\tan\left(\cos\left(4x - 8\right)\right) \tag{11}$$

$$\cos\left(\frac{1}{-2x - 2}\right) \tag{12}$$

$$2\sin\left(\ln\left(x\right)\right) - 3 \tag{13}$$

$$\tan\left(e^{-7x}\right) \tag{14}$$

$$\sin\left(\ln\left(\csc\left(x\right)\right)\right) \tag{15}$$

$$\frac{1}{\tan\left(\cos\left(x\right)\right)} \tag{16}$$

$$\sin\left(e^{5-x}\right) \tag{17}$$

$$\frac{1}{\sin^2\left(\sin\left(x\right)\right)} \tag{18}$$

$$\tan\left(56x - 67\right) \tag{19}$$

$$\cos\left(\tan\left(x^3\right)\right) \tag{20}$$

2 Matrices

Calculate the inverse of the following:

$$\begin{bmatrix} -6 & -1 & 7 \\ 6 & -7 & -2 \\ -9 & -8 & -7 \end{bmatrix} \tag{21}$$

$$\begin{bmatrix} 4 & 9 & 4 \\ 8 & -5 & -8 \\ 8 & 6 & -1 \end{bmatrix} \tag{22}$$

$$\begin{bmatrix} -1 & -3 & -4 \\ -3 & 5 & 3 \\ 0 & -3 & -7 \end{bmatrix} \tag{23}$$

$$\begin{bmatrix} 6 & -7 & -5 \\ -1 & 6 & 1 \\ 0 & -9 & -1 \end{bmatrix} \tag{24}$$

$$\begin{bmatrix} 0 & 6 & 2 \\ -7 & 6 & 4 \\ -9 & 3 & -9 \end{bmatrix} \tag{25}$$

$$\begin{bmatrix} -3 & 4 & -9 \\ -2 & 2 & -2 \\ -8 & 2 & -9 \end{bmatrix} \tag{26}$$

$$\begin{bmatrix} -2 & -2 & -7 \\ 7 & 0 & 7 \\ -8 & 0 & 6 \end{bmatrix} \tag{27}$$

$$\begin{bmatrix} -7 & 8 & 1 \\ -2 & 3 & 9 \\ 3 & -5 & 4 \end{bmatrix} \tag{28}$$

$$\begin{bmatrix} 6 & 2 & 2 \\ -7 & -6 & -6 \\ -9 & 5 & -5 \end{bmatrix} \tag{29}$$

$$\begin{bmatrix} 1 & -5 & 2 \\ 7 & -8 & 0 \\ -9 & 4 & -6 \end{bmatrix} \tag{30}$$

3

Expand the following expressions:

$$\left(x - 10\right)^2 \left(x - 9\right) \tag{31}$$

$$\left(x - 1\right)\left(x + 4\right)\left(x + 8\right) \tag{32}$$

$$\left(x - 7\right)\left(x - 5\right)\left(x - 1\right) \tag{33}$$

$$\left(x - 10\right)\left(x + 5\right)\left(x + 7\right) \tag{34}$$

$$(x-7)(x-3)(x+6) \tag{35}$$

$$(x-7)(x+3)(x+9) \tag{36}$$

$$(x-5)(x+6)(x+8) \tag{37}$$

$$(x-7)(x-3)(x+5) \tag{38}$$

$$(x-5)(x-2)(x+1) \tag{39}$$

$$(x-10)^2(x-7) \tag{40}$$