1 Calculus

Differentiate the following:

$$\tan(x) \tag{1}$$

$$\ln\left(\frac{1}{\sin^9(x)}\right) \tag{2}$$

$$8\sin\left(\frac{1}{x^7}\right) - 9 \tag{3}$$

$$\ln\left(\frac{1}{-10x-10}\right) \tag{4}$$

$$\frac{1}{\sin^{10}(\sec(x))} \tag{5}$$

$$-\tan(\sec(x) - 3) \tag{6}$$

$$\sin\left(\tan\left(\frac{1}{x}\right)\right) \tag{7}$$

$$\ln\left(\cos\left(\frac{1}{x^6}\right)\right) \tag{8}$$

$$e^{\cos(2x-7)} \tag{9}$$

$$64\sin(x) + 7 \tag{10}$$

$$\sin(\sin(\tan(x))) \tag{11}$$

$$\frac{1}{(5\tan(x)+6)^2} \tag{12}$$

$$\frac{1}{\sec(\ln(x))} \tag{13}$$

$$e^{9x} \tag{14}$$

$$4 - \frac{1}{\tan^3(x)} \tag{15}$$

$$\tan(5e^x + 1) \tag{16}$$

$$\frac{1}{36-72x} \tag{17}$$

$$\tan(\tan(\ln(x))) \tag{18}$$

$$\frac{1}{\csc(\ln(x))} \tag{19}$$

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

2 Matrices

Find the inverse of the following:

$$\begin{bmatrix} 2 & -2 & -7 \\ 3 & 1 & 7 \\ -4 & 3 & 5 \end{bmatrix} \tag{21}$$

$$\begin{bmatrix} -9 & 5 & 6 \\ 3 & -8 & -8 \\ 6 & 8 & -8 \end{bmatrix} \tag{22}$$

$$\begin{bmatrix} 3 & 2 & 6 \\ -2 & -3 & 1 \\ 5 & -7 & -6 \end{bmatrix} \tag{23}$$

$$\begin{bmatrix} 3 & -5 & -5 \\ 9 & 3 & -2 \\ -7 & -3 & 4 \end{bmatrix} \tag{24}$$

$$\begin{bmatrix} 4 & -7 & 2 \\ -2 & -4 & 0 \\ 9 & -5 & 3 \end{bmatrix} \tag{25}$$

$$\begin{bmatrix} 9 & 1 & 9 \\ 8 & 8 & -4 \\ 2 & 3 & 6 \end{bmatrix} \tag{26}$$

$$\begin{bmatrix} 0 & -5 & -5 \\ 6 & 1 & 7 \\ -7 & 5 & 0 \end{bmatrix} \tag{27}$$

$$\begin{bmatrix} 6 & -5 & 3 \\ -6 & 3 & 9 \\ 2 & -6 & 7 \end{bmatrix} \tag{28}$$

$$\begin{bmatrix} 4 & 1 & 1 \\ 6 & -3 & 2 \\ -6 & -2 & 0 \end{bmatrix} \tag{29}$$

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

3 Algebra

Expand the following:

$$(x-9)(x+2)(x+7) \tag{31}$$

$$(x+4)(x+7)(x+8) \tag{32}$$

$$(x-7)^2(x-4) \tag{33}$$

$$(x-8)(x-5)(x-1) \tag{34}$$

$$(x-6)(x-5)(x+4) \tag{35}$$

$$(x-1)(x+6)(x+8) \tag{36}$$

$$(x+2)(x+4)(x+6) \tag{37}$$

$$(x-10)(x-1)(x+4) \tag{38}$$

$$(x-10)(x+7)(x+8) \tag{39}$$

$$(x-8)(x+2)(x+9) \tag{40}$$