1. Are the following two vectors perpendicular? Explain briefly. (2 points)

$$\left[\begin{array}{c}0\\7\\2\end{array}\right]\left[\begin{array}{c}3\\-1\\4\end{array}\right]$$

Same as 622 #1

2. Is the following matrix invertible? Briefly explain. (3 points)

All you need to do $A = \begin{bmatrix} 1 & 2 \\ 0 & 4 \end{bmatrix}$ is calculate the determinant.

If the denominator was 0 then we couldn't invert.

So yes, because the determinant is

3. Find the gradient of f at (1,1,1). (5 points)

$$f(x, y, z) = x^3 z^2 + xy^2 + 3z^4 + x + 5$$

Vt on 622 side.

Plug in (1,1,1)

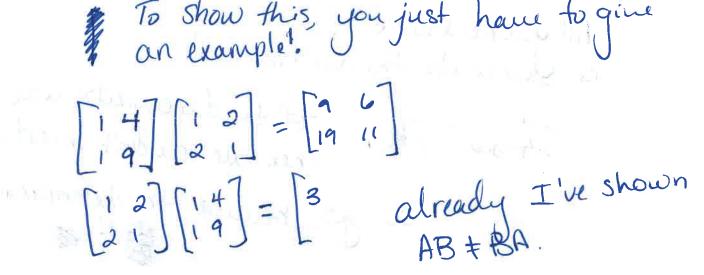
Useful Formulas

$$\left[\begin{array}{cc} a & b \\ c & d \end{array}\right]^{-1} = \frac{1}{ad - bc} \left[\begin{array}{cc} d & -b \\ -c & a \end{array}\right]$$

1. Are the following two vectors perpendicular? Explain briefly. (2 points)

No, because their dot product is not
$$\emptyset$$
.
0.3+7.++2.4 = 1 \neq 0

2. Show that matrix multiplication is not commutative. That is $AB \neq BA$. (5 points)



3. Find the gradient of f. (3 points)

$$f(x,y,z) = x^{3}z^{2} + xy^{2} + 3z^{4} + x + 5$$

$$\frac{\partial f}{\partial x} = 3x^{2}z^{2} + y^{2} + 1$$

$$\nabla f = 3x^{2}z^{2} + y^{3}z^{4} + x + 5$$

$$\frac{\partial f}{\partial y} = 2xy$$

$$\frac{\partial f}{\partial z} = 2x^3z + 12z^3$$

$$\nabla f = (3x^2z^2+y^2+1),$$
 $2xy,$
 $2x^3z+12z^3$