a: $\binom{7}{8}$

b: $\binom{7}{8} - \binom{4}{3} = \binom{3}{5}$

c: $\sqrt{5^2 + 3^2} = \sqrt{34} = 5,8309$

d: $\binom{2}{-2} + \binom{5}{2} = \binom{7}{0}$

e 1: $\binom{3}{2} + \binom{5}{1} = \binom{8}{3}$

e 2: $\binom{5}{1} + \binom{-2}{6} = \binom{3}{7}$

e 3: $\binom{3}{2} + \binom{5}{1} + \binom{-2}{6} = \binom{6}{9}$

e 4: $\binom{3}{2} + \binom{5}{1} + \binom{-2}{6} = \binom{6}{9}$

e 5: $\binom{5}{1} + \binom{3}{2} = \binom{8}{3}$

f + g

$$\bar{x} = \left(\frac{5cos(\frac{\pi}{5})}{5sin(\frac{\pi}{5})}\right) = \left(\frac{4,999699}{0,05483}\right)$$

h

$$\left|\bar{f}\right| = \sqrt{5cos(\tfrac{\pi}{5})^2 + 5sin(\tfrac{\pi}{5})^2} = \sqrt{25} = 5$$

i

$$\bar{a} = \binom{-4}{5},\ \bar{b} = 5\bar{a} \Rightarrow \binom{5*-4}{5*5} = \binom{-20}{25}$$

j

$$|\bar{a}| = \sqrt{-4^2 + 5^2} = \sqrt{41} = \ 6,4$$

k

$$\left|\bar{b}\right| = \sqrt{-20^2 + 25^2} = \sqrt{1025} = 32,01$$

l

$$\bar{x} = \left(\frac{1}{0}\right) * 4 = \left(\frac{4}{0}\right)$$

m

$$\bar{x} = \left(\frac{1}{3}\right) * \frac{1}{2} = \left(\frac{\frac{1}{2}}{1,5}\right)$$

n

$$\widehat{a} = \left(\frac{\frac{\bar{a}x}{\sqrt{\bar{a}x^2 + \bar{a}y^2}}}{\frac{\bar{a}y}{\sqrt{\bar{a}x^2 + \bar{a}y^2}}} \right)$$

$$|q| = \sqrt{(-2)^2 + 1^2} = \sqrt{5}$$

$$u = \frac{<-2,1>}{\sqrt{5}} = \ <-\frac{2}{\sqrt{5}}, \frac{1}{\sqrt{5}}>$$

o

$$\widehat{a} = \left(\frac{\frac{\bar{a}x}{\sqrt{\bar{a}x^2 + \bar{a}y^2}}}{\frac{\bar{a}y}{\sqrt{\bar{a}x^2 + \bar{a}y^2}}} \right) = \left(\frac{\frac{3}{\sqrt{3^2 + 2^2}}}{\frac{2}{\sqrt{3^2 + 2^2}}} \right) = \left(\frac{0,832}{0,554} \right)$$

p

$$\hat{a} = \begin{pmatrix} \frac{\bar{a}x}{\sqrt{\bar{a}x^2+\bar{a}y^2}} \\ \frac{\bar{a}y}{\sqrt{\bar{a}x^2+\bar{a}y^2}} \end{pmatrix} = \begin{pmatrix} \frac{7}{\sqrt{7^2+-2^2}} \\ \frac{-2}{\sqrt{7^2+-2^2}} \end{pmatrix} = \begin{pmatrix} 0{,}961 \\ -0{,}274 \end{pmatrix}$$

q

$$\bar{a} = \binom{2}{3}, \bar{b} = \binom{4}{6} =>$$

$$\bar{a} * \bar{b} = (2x4) + (3x6)xcos(0) \ => 26x1 = 26$$

r

$$\bar{a} = \binom{2}{3}, \bar{b} = \binom{-3}{2} =>$$

$$\bar{a} * \bar{b} = |\bar{a}|\, x\, |\bar{b}|\, x\, cos(0) \ => \sqrt{2^2+3^2}\ x\ \sqrt{-3^2+2^2}\ x\ cos(90) \ =>$$

0

```
import numpy
import math

# S


def mag(vec):
    # Pythagoras
    return numpy.array(math.sqrt(vec[0] ** 2 + vec[1] ** 2))

# S


def mag1(vec):
```

```
    return numpy.linalg.norm(vec)

# T


def unit(vec):
    x = vec[0]
    y = vec[1]
    length = mag(vec)
    print(length)
    return numpy.array([x/length, y/length])

# T


def unit1(vec):
    return vec/mag(vec)

# U


def rot90(vec):
    x = vec[0]
    y = vec[1]
    return numpy.array([-y, x])

# V


def scalar_multiply(scalar: float, vec):
    return numpy.array([scalar * v_i for v_i in vec])


def add(vec1, vec2):
    x1 = vec1[0]
    y1 = vec1[1]
    x2 = vec2[0]
    y2 = vec2[1]
    return numpy.array([x1 + x2, y1+y2])

# W
def sub(vec1, vec2):
    x1 = vec1[0]
```

```
    y1 = vec1[1]
    x2 = vec2[0]
    y2 = vec2[1]
    return numpy.array([x1 - x2, y1 - y2])

# W
a = [3, 2]
b = [8,7]
c = [1,5]


print(mag1(a))    # S
print(unit1(a))   # T
print(rot90(a))     # U
print(scalar_multiply(2, a))  # V
print(sub(add(a, b), b)) # W
print(numpy.dot(a, a)) # Y
print(mag(a) * mag(a)) # Y
print(numpy.dot(a,b)) # Z
print(numpy.dot(a, rot90(a))) # Æ
```