

# Computação Gráfica

pag. 18.

a)  $a = (2, 4)$   $b = (6, 2)$  fórmula:  $\langle x_{pf} - x_{pi}, y_{pf} - y_{pi} \rangle$

b)  $\Rightarrow a = (6, 7)$   $b = (-1, -2)$   
 $\langle 6 - 2, 7 - 4 \rangle = \langle 4, 3 \rangle$   
 $\langle -1 - 6, -2 - 7 \rangle = \langle -7, -9 \rangle$

c)  $\Rightarrow a = (2, 2, 4)$   $b = (1, 1, 1)$

$\langle 1 - 2, 1 - 2, 1 - 4 \rangle = \langle -1, -1, -3 \rangle$

d)  $\Rightarrow a = (-2, 4, -5)$   $b = (5, 2, -5)$

$\langle 5 + 2, 2 - 4, -5 + 5 \rangle = \langle 7, -2, 0 \rangle$

pag. 19

fórmula:  $\sqrt{x^2 + y^2 + z^2}$

a)  $a = \langle 2, -5 \rangle = \sqrt{2^2 + (-5)^2}$   
 $\sqrt{4 + 25} = \sqrt{29}$

b)  $b = \langle 4, 2 \rangle = \sqrt{4^2 + 2^2}$   
 $\sqrt{16 + 4} = \sqrt{20}$

c)  $c = \langle 3, 5, -6 \rangle = \sqrt{3^2 + 5^2 + (-6)^2}$   
 $\sqrt{9 + 25 + 36} = \sqrt{70}$

d)  $d = \langle 6, -2, 1 \rangle = \sqrt{6^2 + (-2)^2 + 1^2}$   
 $\sqrt{36 + 4 + 1} = \sqrt{41}$

pag. 20

fórmula  $(x_p + x_v, y_p + y_v, z_p + z_v)$

a)  $u = (2, -5)$   $v = \langle 2, 4 \rangle = (2+2, -5+4) = (4, -1)$

b)  $u = (3, 5, -6)$   $v = \langle -3, 2, -3 \rangle$   
 $(3-3, 5+2, -6-3) = (0, 7, -9)$

pag. 22

fórmula  $\langle x_{va} + x_{vb}, y_{va} + y_{vb}, z_{va} + z_{vb} \rangle$

a)  $u = \langle 2, -5 \rangle$   $v = \langle 2, 4 \rangle$   
 $\langle 2+2, -5+4 \rangle = \langle 4, -1 \rangle$

b)  $u = \langle 3, 2 \rangle$   $v = \langle 1, 7 \rangle$   
 $\langle 3-1, 2-7 \rangle = \langle 2, -5 \rangle$

c)  $u = \langle 3, 5, -6 \rangle$   $v = \langle -3, 2, -3 \rangle$   
 $\langle 3+(-3), 5+2, -6-3 \rangle = \langle 0, 7, -9 \rangle$

d)  $u = \langle 5, 5, 1 \rangle$   $v = \langle 3, 1, 7 \rangle$   
 $\langle 5-3, 5-1, 1-7 \rangle = \langle 2, 4, -6 \rangle$

pag. 24

a)  $v = \langle 2, 4 \rangle$   $u = 3 : v * u$   
 $\langle 2 * 3, 4 * 3 \rangle = \langle 6, 12 \rangle$

b)  $v = \langle 1, 7, 5 \rangle$   $u = -5$   
 $\langle 1 * (-5), 7 * (-5), 5 * (-5) \rangle = \langle -5, -35, -25 \rangle$

c)  $v = \langle 12, 3 \rangle$

$|v| = \sqrt{12^2 + 3^2} = \sqrt{144+9} = \sqrt{153}$

$u = \left\langle \frac{12}{\sqrt{153}}, \frac{3}{\sqrt{153}} \right\rangle$



pag. 26

a)  $a = \langle 2, -4 \rangle$   $b = \langle 5, 3 \rangle$

$$\{2 \cdot 5 + 3 \cdot (-4)\} = \{20 + (-12)\} = 8$$

b)  $a = \langle 1, 7, 5 \rangle$   $b = \langle 2, 4, 5 \rangle$

$$(1 \cdot 2 + 7 \cdot 4 + 5 \cdot 5) = (2 + 28 + 25) = 55$$

c)  $a = \langle -3, 4, -5 \rangle$

$$|a| = \sqrt{(-3)^2 + 4^2 + (-5)^2}$$

$$|a| = \sqrt{9 + 16 + 25}$$

$$|a| = \sqrt{50}$$

$$u = \frac{a}{|a|} = \left\langle \frac{-3}{\sqrt{50}}, \frac{4}{\sqrt{50}}, \frac{-5}{\sqrt{50}} \right\rangle$$

pag. 29

a)  $a = \langle 2, -4 \rangle$   $b = \langle 5, 3 \rangle$

$$\langle 0, 0, 2 \cdot 3 - (-4) \cdot 5 \rangle = \langle 0, 0, 6 - (-20) \rangle = \langle 0, 0, 26 \rangle$$

b)  $a = \langle 1, 7, 5 \rangle$   $b = \langle 2, 4, 5 \rangle$

$$\langle 7 \cdot 5 - 5 \cdot 4, 7 \cdot 2 - 1 \cdot 5, 1 \cdot 4 - 7 \cdot 2 \rangle = \langle 35 - 20, 14 - 5, 4 - 14 \rangle$$

$$\langle 15, 9, -10 \rangle$$