TEST 2
SOLUTIONS

Problem 1

First, interpolate the available values along horizontal edges.
Value at $(0.2, 0)$: $0.2 \times 10 + 0.8 \times 0 = 2$
Value at $(0.2, 1)$: $0.2 \times 0 + 0.8 \times 20 = 16$.
Then, in the vertical direction:
Value at $(0.2, 0.4)$: $0.4 \times 16 + 0.6 \times 2 = 6.4 + 1.2 = 7.6$

Problem 2

(2a) Yes. Vector connecting the last two control points for B1: $[2, -2]$. Vector connecting the first two control points of B2: $[4, -4]$. One is a positive multiple of the other.
(2b) No. Vector connecting the last two control points for B2: $[-3. - 3]$. Vector connecting the first two control points of B1: $[1, 1]$. They are not positive multiples of each other
Alternative explanation: $(4, 0)$ is between $(2, 2)$ and $(8, -4)$; $(0, 0)$ is not between $(1, 1)$ and $(3, 3)$.

Problem 3

Here is an example:

```
h0:= w.h
h:= h0
do
  h:= h.o.n
  print h
while h different than h0
```

Problem 4

Just apply subdivision once to get the answer. First, double then average 3 times. Last line below is the answer.

$$
\begin{aligned}
&(8,8),(8,0),(16,0),(24,0) \longrightarrow \text{[double]} \longrightarrow\\
&(8,8),(8,8),(8,0),(8,0),(16,0),(16,0),(24,0),(24,0) \longrightarrow \text{[average]} \longrightarrow\\
&(8,8),(8,4),(8,0),(12,0),(16,0),(20,0),(24,0) \longrightarrow \text{[average]} \longrightarrow\\
&(8,6),(8,2),(10,0),(14,0),(18,0),(22,0) \longrightarrow \text{[average]} \longrightarrow\\
&(8,4),(9,1),(12,0),(16,0),(20,0)
\end{aligned}
$$

Problem 5

There are several good answers here. A particularly simple one is just a linear graph

$$\begin{array}{l} [(-2,3)(-2,-3)] \to [(2,3)(2,-3] \to [(-1,2)(1,2)] \to \\ \to [(-1,1)(1,1)] \to [(-1,-1),(1,-1)] \to [(-1,-2),(1,-2)] \end{array}$$

To get other answers, you could run the recursive BSP tree construction algorithm.

Problem 6

$$\begin{bmatrix} 2 & 3 & 1 \\ 3 & 2 & 0 \\ 0 & 1 & 3 \\ 0 & 2 & 1 \end{bmatrix}$$