# Module 3: Answers

1. Apply the horizontal Sobel edge detector to the following image patch. Use border values to extend the image where necessary.

10 | 20  
-------  
30 | 40

**Answer**

-80 | -80  
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-80 | -80

1. Apply the averaging blur filter to the following image patch. Use border values to extend the image where necessary. Round output values to nearest integer.

10 | 20  
-------  
30 | 40

**Answer**

16 | 23  
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27 | 30

1. Name the advantages and disadvantages of processing images at a higher resolution.

**Advantages: more information, higher quality picture**

**Disadvantages: slower, more processing**

1. Threshold the following grayscale image using 127 as the threshold.

50 | 100  
-------  
150 | 200

**Answer**

0 | 0  
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1 | 1

1. Apply the Gaussian blur filter to the following image patch. Use border values to extend the image where necessary. Round output values to the nearest integer.

10 | 20  
-------  
30 | 40

**Answer**

14 | 21  
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20 | 36

1. All the lines running through a single point in Cartesian become what in the Hough space?

**A curve**

1. In Hough space, how are likely lines selected?

**When curves intersect in Hough space, this corresponds to lines that run through multiple points in Cartesian space. The (r,theta) parameters at the intersection are likely lines in the image.**

1. What does the zeroth order spatial moment represent?

**It represents the area of a segmented object.**

1. What is meant by 24-bit color?

**Each color channel is represented by 8-bit (1 byte). There are 3 color channels: Red, Green, and Blue.**

1. How can a color image be converted to grayscale?

**Average the RGB values for each pixel. The averaged value is the grayscale value for the pixel.**