

91908R



Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 3 Digital Technologies and Hangarau Matihiko 2025

91908 Analyse an area of computer science

Credits: Three

RESOURCE BOOKLET

Refer to this booklet to answer the questions for 91908.

Check that this booklet has pages 2–4 in the correct order and that none of these pages is blank.

YOU MAY KEEP THIS BOOKLET AT THE END OF THE EXAMINATION.

RESOURCE A (Computer graphics): Bresenham's line drawing algorithm**Option One**

$$A = 2 \times (y_2 - y_1)$$

$$B = A - 2 \times (x_2 - x_1)$$

$$P = A - (x_2 - x_1)$$

To draw the line, fill the starting pixel, and then for every position along the x axis:

- If P is less than 0, draw the new pixel on the same line as the last pixel, and add A to P.
- If P is 0 or greater, draw the new pixel on a line higher than the last pixel, and add B to P.
- Repeat this decision until you reach the end of the line.

Option Two

$$P = (2 * dy) - dx$$

If $P < 0$

$$x1 = x1 + 1;$$

$$P = P + (2 * dy)$$

If $P \geq 0$

$$x1 = x1 + 1;$$

$$y1 = y1 + 1;$$

$$P = P + (2 * dy) - (2 * dx)$$

RESOURCE B (Computer graphics): The levels of ray tracing

Source: <https://gfxspeak.com/featured/the-levels-tracing>

RESOURCE C (Computer vision): Convoluted neural network

Source: <https://adeshpande3.github.io/A-Beginner%27s-Guide-To-Understanding-Convolutional-Neural-Networks>

RESOURCE D (Computer vision): Canny edge detection

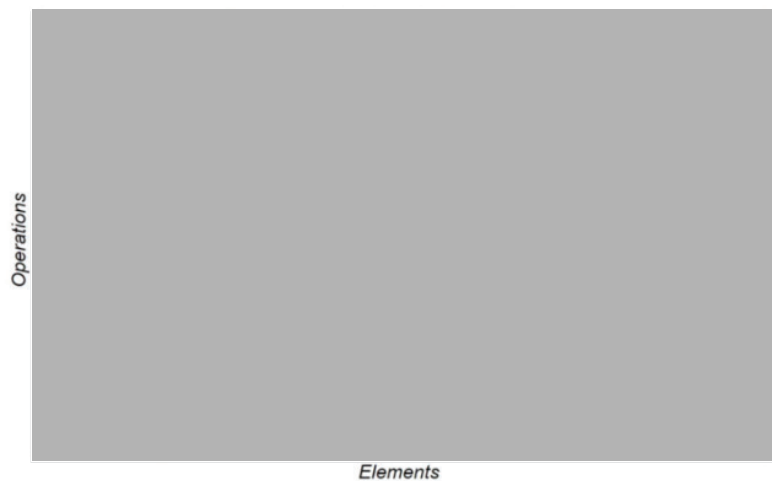
Source: <https://towardsdatascience.com/the-effortless-way-to-process-images-with-opencv-canny-algorithm-9c636d8a017a>

RESOURCE E: (Computer vision): Viola-Jones and Haar-like features

Source: <https://maelfabien.github.io/tutorials/face-detection/#1-theory>

RESOURCE F (Computer vision): Thresholding

Source: https://www.bogotobogo.com/python/OpenCV_Python/python_opencv3_Image_Global_Thresholding_Adaptive_Thresholding_Otsus_Binarization_Segmentations.php

RESOURCE G (Complexity and tractability): Big-O complexity chart

Source: <https://www.freecodecamp.org/news/all-you-need-to-know-about-big-o-notation-to-crack-your-next-coding-interview-9d575e7eec4>

RESOURCE H (Complexity and tractability): Types of complexity

Source: <https://www.geeksforgeeks.org/types-of-complexity-classes-p-np-conp-np-hard-and-np-complete>