

5. (a) What are the main components of a GPU-based framebuffer graphics system? [4]
- (b) Detail the 3D Viewing Pipeline, carefully explaining where texture-mapping, blending and atmospheric effects, like fog, can be combined with vertex operations. [4]
- (c) Derive Bresenham's decision parameter P_{k+1} for the $k + 1$ step of a line, given that $P_k = 2\Delta y x_k - 2\Delta x y_k + K$, where (x_k, y_k) is the currently set pixel, the slope is $\frac{\Delta y}{\Delta x}$ and K is a constant term. What are the two values that P_{k+1} can take? [8]
- (d) Outline how the Mid-point method works in efficiently scan converting implicit curves. Derive the starting decision parameter value, P_0 , for a drawing a circle centred at the origin, with radius r . [9]