Complete the following problems on a separate sheet of paper and staple this page to the front of your work. Show work completely and clearly. Your score will be evaluated on the process as well as the solution. Use graph paper for all sketches. You may download graph paper forms from the course web page.

1. Write the equation of the line that passes through the center of the circle defined by \(x^2 + y^2 - 8x + 2y + 5 = 0\) and the midpoint of the line segment with endpoints \((-11,3)\) and \((7,-9)\). (Bonus point: What is the radius of the circle?) \([8\text{ points}]\)

2. Determine the value of \(A\) so that the line whose equation is \(Ax + y - 2 = 0\) is perpendicular to the line containing the points \((1,-3)\) and \((-2,4)\). \([3\text{ points}]\)

3. To evaluate \(g(x)\), subtract four from the input and multiply the square of the result by \(-\frac{1}{2}\). Express this verbal representation of the function \(g(x)\) in three additional ways. \([6\text{ points}]\)

4. Find a formula for the piecewise-defined function \(f(x)\) pictured below: \([8\text{ points}]\)