

1. [5 points; C level] A circle has center  $(-1, 2)$  and radius 5. Find its equation in standard form.
2. [5 points; C level] Find the average rate of change of  $f(x) = x^2 + 2$  from  $x = 1$  to  $x = 3$ . Simplify your answer.
3. [5 points; C level] Let  $f(x) = 3x + 2$  and  $g(x) = 7x - 5$ . Find and simplify  $h(x) = (f \circ g)(x) - (g \circ f)(x)$ .
4. [5 points; C level] What is the domain of  $f(x) = \sqrt{2x - 5}$ ? Express your answer in interval notation.
5. [5 points; B level] Find a polynomial  $p(x)$  with integer coefficients of degree 3 and with zeros at  $x = 3$  and  $x = i$ .

6. [10 points; C level] Graph  $y = \frac{1}{x+1} + 2$ . Label at least four points including all intercepts and label the asymptotes.

7. [10 points; C level] Graph  $y = x^2 + 8x + 15$ . Label at least four points including the vertex and all intercepts.

8. [5 points; C level] Graph  $y = (x - 3)(x + 1)^2$ . Label at least four points including all intercepts.

9. [5 points; C level] Graph  $y = (x - 3)^2(x + 1)^2$ . Label at least four points including all intercepts.

10. [10 points; B level] Let  $f(x) = 2x^3 - 7$ . Find  $f^{-1}(x)$ , that is, find the inverse of the function. (The  $-1$  does not mean reciprocal in this context.)

11. [10 points; A level] Graph  $y = \sqrt{25 - x^2}$ . Label the intercepts. What shape is it?

12. [15 points; B level] Factor  $x^4 + 2x^3 - 2x - 1$  completely.

13. [10 points; A level] The graph below defines a function  $f(x)$ . Graph each of the following,  
(a)  $y = |f(x)|$ , (b)  $y = -f(-x)$ , (c)  $y = f(|x|)$ , (d)  $y = (f(x))^2$ , (e)  $y = f(2)x + 1$ .