For more information and practice, see the course OpenLab blog

Instructions: These problems are for you to use to test yourself, **after** you have practiced with the routine homework assignments, to see how ready you are for Test 3. They are not meant as a substitute for regular and diligent practice!

Do the following problems as if you were taking a test: without notes or textbook, and give yourself a time limit as stated at the start of each self-test. At the end of that time, check your answers Then review as needed before you repeat the self-test. Make sure that you are correctly using methods taught in class.

Self-Test A - allow 50 minutes

1a) Find all the exact roots of the polynomial

$$2x^4 + 5x^3 + 5x^2 + 20x - 12$$

You must explain or show how you know that they are roots of f(x): you may look at the graph of $f(x)$ to help you narrow down the possibilities, but you must use some algebraic means to show that they are actually roots.

1b) Factor the polynomial in part (a) completely over the complex numbers.

2) For the rational function

$$f(x) = \frac{5}{(x+2)^2(x-1)}$$

Algebraically find the domain, the x- and y-intercepts, and the equations of the vertical and horizontal asymptotes; and then sketch a complete graph of the function.

3) Solve the inequality and give your answer in interval form:

$$\frac{x^2 - 4x}{2x^2 - 18} \leq 0$$

4) Solve the inequality and give your answer in interval form:
$x^3 - 5x^2 + 6x > 0$

5) Find the domain, the x-intercept, and the equation of the asymptote, and draw a complete graph of $f(x) = \ln(2 - x)$

Self-Test B - allow 50 minutes

1) For the polynomial $f(x) = x^3 + 2x^2 - 3x - 6$

a) Find the exact values of the roots of $f(x)$. You must explain or show how you know that they are roots of f(x): you may look at the graph of $f(x)$ to help you narrow down the possibilities, but you must use some algebraic means to show that they are actually roots.

b) Use the roots you found in part (a) to factor f completely.

2a) For the rational function

$$f(x) = \frac{6x^2}{x^2 - 3x - 10}$$

Find **algebraically** the domain, the x- and y-intercepts, and the equations of the vertical and horizontal asymptotes; and then sketch a complete graph of the function.

2b) Solve the inequality and give your answer in interval form:

$$\frac{6x^2}{x^2 - 3x - 10} \geq 0$$

3) Solve the inequality and give your answer in interval form:

$$x^3 + 9x < 6x^2$$

4) Find the domain, the x-intercept, and the equation of the asymptote, and sketch a complete graph of $f(x) = \log(x - 3) - 2$