

Functions and limits test

Maths 3b/3c

Name: _____

1. State whether these are polynomials or not. (1 0 0) each

a) $x^3 - 6x^2 + 3x - 6 - \frac{1}{x} + \frac{2}{x^2}$

b) $6 - x^{-1} + 2x^{-2} - 11x^{-3}$

c) $3x - 2 - \sqrt{x}$

d) $3x^{\frac{1}{2}} - 2x^{\frac{3}{2}} + 4x^{\frac{5}{2}}$

2. Multiply the following polynomials:

a) $(3x + 6) \cdot (4 - 2x)$ (1 1 0)

b) $(x^2 - 2x - 3) \cdot (2x^2 - 3x + 4)$ (1 1 0)

c) $(3x^2 - 5x - 2) \cdot (x^3 + 4x^2)$ (1 1 0)

d) $(-x^3 + 5x^2 + 3x - 1) \cdot (2x^2 - 2x + 3)$ (1 2 0)

3. Find the intersections with the x-axis of the following polynomial functions:

a) $f(x) = x^2 - 3x - 2$ (1 1 0)

b) $g(x) = 2x^2 + 3x - 9$ (1 1 1)

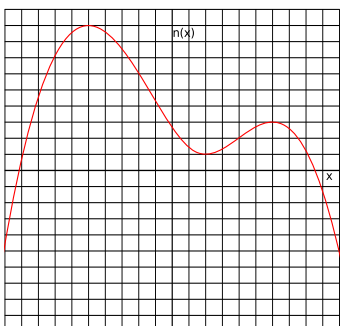
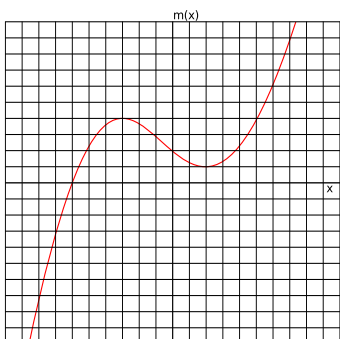
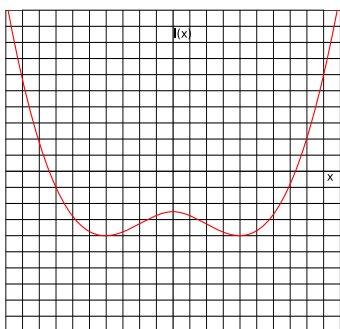
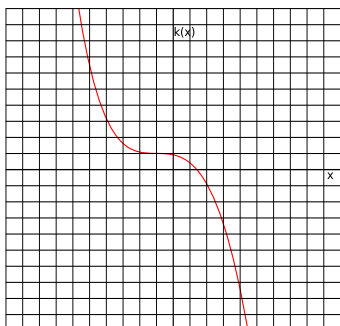
c) $h(x) = x^2 - 6x + 9$ (1 1 0)

d) $i(x) = x^2 + x + 1$ (0 1 1)

e) $j(x) = (x - 4) \cdot (x + 3) \cdot (x + \frac{4}{3}) \cdot (x - 0,008) \cdot (x + \sqrt{6})$ (1 1 2)

4. For each of the functions depicted:

- Identify them as second, third or fourth degree polynomials. State why. (1 1 0) each
- Find their maximum, minimum and saddle points, if they have. (1 1 0) each
- Separate in the graph the sections where the functions are increasing and the sections where they are decreasing. (0 1 0) each



5. Find the maximum or minimum point of these polynomial functions.

a) $o(x) = (x - 6) \cdot (x + 5)$ (1 1 0)

b) $p(x) = 4x^2 - 8x + 3$ (1 1 1)

c) $i(x)$ (1 2 0)

6. Factorize these polynomials

a) $x^2 - 6x + 8$ (1 1 0)

b) $x^2 + 2x - 3$ (1 1 0)

c) $3x^3 + 9x^2 - 12x$ (1 1 1)

7. Simplify these rational expressions.

a) $\frac{x^2+3x+2}{2x+4}$ (1 1 0)

b) $\frac{2x^2-8x-10}{4x^2-4}$ (1 1 1)

c) $\frac{6}{x-4} + \frac{2x}{x-3} + \frac{2x}{(x^2-7x+12)}$ (1 2 1)

8. Calculate these limits

a)

$$\lim_{x \rightarrow 2} \frac{x^2 + 5x - 6}{x + 6}$$

(1 2 0)

b)

$$\lim_{x \rightarrow -6} \frac{x^2 + 5x - 6}{x + 6}$$

(1 1 1)

c)

$$\lim_{x \rightarrow \infty} \frac{x^3 - 6x^2 - 8x + 13}{2x^3 + 16x^2 - 14x + 12}$$

(1 1 0)