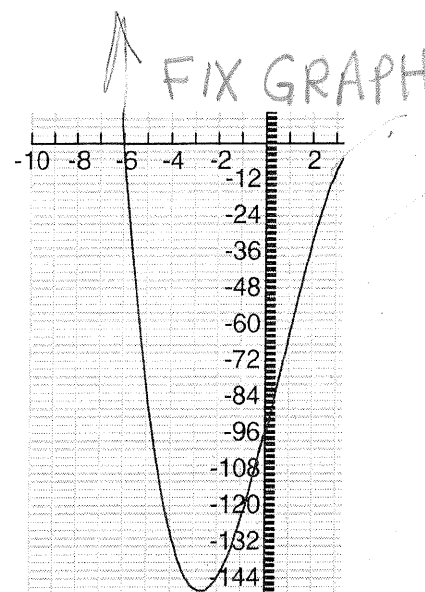


Murcin (NG) 2013  
solutions

1. State the positive and negative intervals for the graph, intervals of increasing and decreasing.



FACTOR!

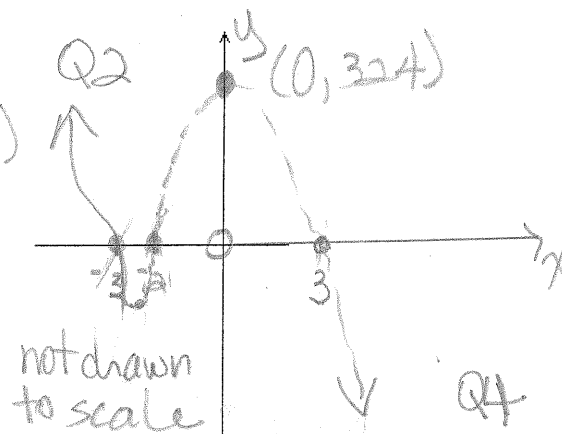
2. Sketch the function  $f(x) = -(x^2 + 5x + 6)(2x + 6)(x^2 - 9)$

$$f(x) = -2(x+3)(x+2)(x+3)(x+3)(x-3)$$

$$f(x) = -2(x+3)^3(x+2)(x-3)$$

$(0, 324)$  "S" shape, pt. of inflection

$(-2.5, -0.6875)$



3. A beach ball is the shape of a sphere. The volume,  $V$ , in cubic centimeters, is given by the equation  $V(r) = \frac{4}{3}\pi r^3$ , where  $r$  is the radius, in centimetres. Determine the rate at which ball's volume is changing when the radius measures 10 cm.

FIX ?

$$f(10) = \frac{4}{3}\pi(10)^3$$

$$f(10+h) = \frac{4}{3}\pi(10+h)^3$$

$$= \frac{4}{3}\pi(10+h)(100+20h+h^2) = \frac{4}{3}\pi(1000+200h+10h^2+100h+20h^2+h^3)$$

$$= \frac{4}{3}\pi(h^3+20h^2+300h+1000)$$

$$= \frac{4}{3}\pi h^3 + \frac{80\pi h^2}{3} + 400\pi h + \frac{4000\pi}{3}$$

lim tangent =  $\lim_{h \rightarrow 0} \frac{f(10+h) - f(10)}{h}$

$$= \lim_{h \rightarrow 0} \left[ \frac{4\pi h^3}{3} + \frac{80\pi h^2}{3} + 400\pi h + \frac{4000\pi}{3} - \frac{4000\pi}{3} \right] \cdot \frac{1}{h}$$

$$= \lim_{h \rightarrow 0} \left[ \frac{4\pi h^2}{2} + \frac{80\pi h}{2} + 400\pi \right]$$

$$400\pi \text{ cm}^3/\text{cm}$$

4. Determine the zeros of the function  $y = 6x^5 - 13x^3 + 6x$ . Provide solutions in simplest radical form.

$$y = x(6x^4 - 13x^2 + 6)$$

$$y = x(3x^2 - 2)(2x^2 - 3)$$

$$\therefore 0 = x(3x^2 - 2)(2x^2 - 3)$$

$$\therefore x = 0 \quad 3x^2 - 2 = 0$$

$$2x^2 - 3 = 0$$

$$3x^2 = 2$$

$$2x^2 = 3$$

$$x = \pm \sqrt{\frac{2}{3}}$$

$$x = \pm \sqrt{\frac{3}{2}}$$

$$x = \pm \frac{\sqrt{6}}{3}$$

RATIONALIZE

$$x = \pm \frac{\sqrt{6}}{2}$$

5. Describe how the graph of  $y = -3\left[\left(\frac{1}{2}x\right)^5 + 5\right]$  can be obtained from the graph of  $y = x^5$ .

$$y = -3\left(\frac{1}{2}x\right)^5 - 15$$

"a" "k" "c"

x	y	(x, y) → (2x, -3y - 15)
-2	-32	
-1	-1	
0	0	
1	1	
2	32	

6. Sketch the following functions:

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

b)  $f(x) = (x-1)(x-2)^2(x-3)(x-4)^3$

c)  $f(x) = x^2(x^2-1)(x-4)^2 \rightarrow x^2(x+1)(x-1)(x-4)^2$

d)  $f(x) = (x^2-x)(x^2-1)(x+1) \rightarrow x(x-1)(x+1)(x-1)(x+1)$

e)  $f(x) = (x^2-4)(x^2-9)$

$$f(x) = (x+2)(x-2)(x-3)(x+3)$$

$$x(x-1)^2(x+1)^2$$