

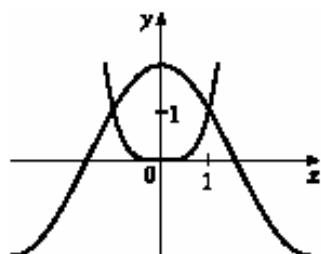
6.  $f(x) = x^5 + 2 \Rightarrow f'(x) = 5x^4$ , so  $x_{n+1} = x_n - \frac{x_n^5 + 2}{5x_n^4}$ .

Now  $x_1 = -1 \Rightarrow x_2 = -1 - \frac{(-1)^5 + 2}{5 \cdot (-1)^4} = -1 - \frac{1}{5} = -1.2 \Rightarrow x_3 = -1.2 - \frac{(-1.2)^5 + 2}{5(-1.2)^4} \approx -1.1529$ .

12.  $2 \cos x = x^4$ , so  $f(x) = 2 \cos x - x^4 \Rightarrow f'(x) = -2 \sin x - 4x^3 \Rightarrow$

$x_{n+1} = x_n - \frac{2 \cos x_n - x_n^4}{-2 \sin x_n - 4x_n^3}$ . From the figure, the positive root of  $2 \cos x = x^4$

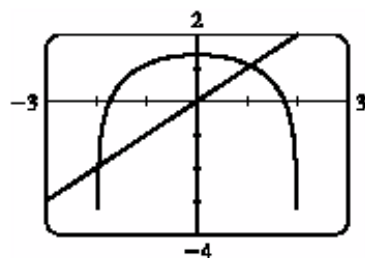
is near 1.  $x_1 = 1 \Rightarrow x_2 \approx 1.014184$ ,  $x_3 \approx 1.013958 \approx x_4$ . So the positive root is 1.013958, to six decimal places.



16. From the graph,  $y = \ln(4 - x^2)$  and  $y = x$  intersect twice, at  $x \approx -2$  and at  $x \approx 1$ .  $f(x) = \ln(4 - x^2) - x \Rightarrow$

$f'(x) = \frac{-2x}{4 - x^2} - 1$ , so  $x_{n+1} = x_n - \frac{\ln(4 - x_n^2) - x_n}{[-2x_n/(4 - x_n^2)] - 1}$ . Trying  $x_1 = -2$  won't work because it's not in the domain

of  $y = \ln(4 - x^2)$ . Trying  $x_1 = -1.9$  also fails after one iteration because the approximation  $x_2$  is less than  $-2$ . We try  $x_1 = -1.99$ .



$x_1 = -1.99$   
 $x_2 \approx -1.97753026$   
 $x_3 \approx -1.96741777$   
 $x_4 \approx -1.96475281$   
 $x_5 \approx -1.96463580$   
 $x_6 \approx -1.96463560 \approx x_7$

$x_1 = 1.1$   
 $x_2 \approx 1.05864851$   
 $x_3 \approx 1.05800655$   
 $x_4 \approx 1.05800640 \approx x_5$

To eight decimal places, the roots of the equation are  $-1.96463560$  and  $1.05800640$ .

26.  $f(x) = x^2 + \sin x \Rightarrow f'(x) = 2x + \cos x$ .  $f'(x)$  exists for all  $x$ , so to find the minimum of  $f$ , we can examine the zeros of  $f'$ . From the graph of  $f'$ , we see that a good choice for  $x_1$  is  $x_1 = -0.5$ . Use  $g(x) = 2x + \cos x$  and  $g'(x) = 2 - \sin x$  to obtain  $x_2 \approx -0.450627$ ,  $x_3 \approx -0.450184 \approx x_4$ . Since  $f''(x) = 2 - \sin x > 0$  for all  $x$ ,  $f(-0.450184) \approx -0.232466$  is the absolute minimum.

