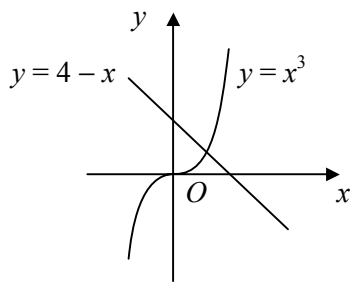


- 1 a $f(1) = -3$ $f(2) = 7$
sign change, $f(x)$ continuous \therefore root
- c $f(-6) = -0.995$ $f(-5) = 0.0135$
sign change, $f(x)$ continuous \therefore root
- e $f(0.4) = -0.351$ $f(0.5) = 0.25$
sign change, $f(x)$ continuous \therefore root
- b $f(0.5) = 2.89$ $f(1) = -0.298$
sign change, $f(x)$ continuous \therefore root
- d $f(2.1) = -1.60$ $f(2.2) = 0.226$
sign change, $f(x)$ continuous \therefore root
- f $f(10) = 6.00$ $f(11) = -9.00$
sign change, $f(x)$ continuous \therefore root
- 2 a $f(0) = -4$
 $f(3) = 17.8$
 $f(1) = -6$
 $f(2) = -0.243$
 $\therefore N = 2$
- b $f(1) = -12$
 $f(5) = 5.65$
 $f(3) = -0.704$
 $f(4) = 2.55$
 $\therefore N = 3$
- c $f(0) = 15$
 $f(-2) = -57$
 $f(-1) = 9$
 $\therefore N = -2$
- d $f(0) = -1.63$
 $f(1) = 3$
 $\therefore N = 0$
- e $f(0) = 1$
 $f(-5) = -2.87$
 $f(-4) = -2.25$
 $f(-3) = 0.473$
 $\therefore N = -4$
- f $f(0) = -6$
 $f(4) = -1.58$
 $f(5) = -0.454$
 $f(6) = 0.684$
 $\therefore N = 5$
- 3 a let $f(x) = x^3 - 12 + \frac{x}{4}$
 $f(2) = -3.5$ $f(3) = 15.75$
sign change, $f(x)$ continuous \therefore root
- c let $f(x) = 10 \ln 3x - 5 + 7x^2$
 $f(0.47) = -0.0178$ $f(0.48) = 0.259$
sign change, $f(x)$ continuous \therefore root
- e let $f(x) = 4^x - 3x - 10$
 $f(-4) = 2.00$ $f(-3) = -0.984$
sign change, $f(x)$ continuous \therefore root
- b let $f(x) = 12e^x - 9 + 4x$
 $f(-1) = -8.59$ $f(0) = 3$
sign change, $f(x)$ continuous \therefore root
- d let $f(x) = \sin 4x - 7e^x$
 $f(-6.5) = -0.773$ $f(-6) = 0.888$
sign change, $f(x)$ continuous \therefore root
- f let $f(x) = \tan\left(\frac{1}{2}x\right) - 2x + 1$
 $f(2.6) = -0.598$ $f(2.7) = 0.0552$
sign change, $f(x)$ continuous \therefore root
- 4 a $f(1) = -1$
 $f(2) = 12.5$
 $f(1.1) = -0.809$
 $f(1.2) = -0.426$
 $f(1.3) = 0.164$
 $\therefore a = 12$
- b $f(2) = -0.303$
 $f(3) = 0.292$
 $f(2.5) = -0.00553$
 $f(2.6) = 0.0537$
 $\therefore a = 25$
- c $f(-2) = -41$
 $f(-1) = 3$
 $f(-1.1) = 0.715$
 $f(-1.2) = -1.96$
 $\therefore a = -12$
- d $f(11) = 0.723$
 $f(12) = -0.177$
 $f(11.7) = 0.0362$
 $f(11.8) = -0.0425$
 $\therefore a = 117$
- e $f(5) = 1.19$
 $f(6) = -1.13$
 $f(5.5) = 0.928$
 $f(5.8) = 0.256$
 $f(5.9) = -0.246$
 $\therefore a = 58$
- f $f(-3) = 6.42$
 $f(-2) = -15.0$
 $f(-2.7) = 2.60$
 $f(-2.6) = 1.03$
 $f(-2.5) = -0.75$
 $\therefore a = -26$

5 a



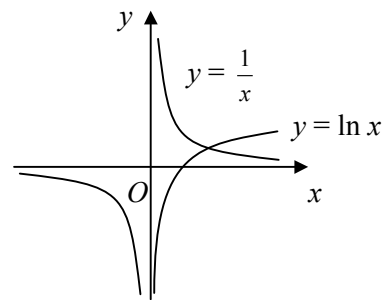
b $x^3 + x - 4 = 0 \Rightarrow x^3 = 4 - x$
the graphs $y = x^3$ and $y = 4 - x$

intersect at exactly one point

\therefore one real root

c let $f(x) = x^3 + x - 4$
 $f(1) = -2$
 $f(1.5) = 0.875$
sign change, $f(x)$ continuous \therefore root

6 a



b $x \ln x - 1 = 0 \Rightarrow x \ln x = 1 \Rightarrow \ln x = \frac{1}{x}$

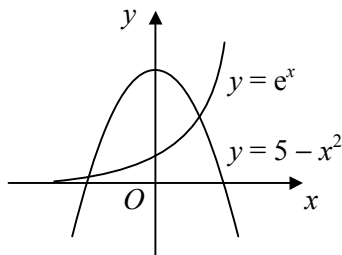
the graphs $y = \ln x$ and $y = \frac{1}{x}$

intersect at exactly one point

\therefore one real root

c $f(1) = -1$
 $f(2) = 0.386$
 $\therefore 1 < \alpha < 2$
 $\therefore n = 1$

7 a



b $e^x + x^2 - 5 = 0 \Rightarrow e^x = 5 - x^2$
the graphs $y = e^x$ and $y = 5 - x^2$
intersect at two points,
one for $x < 0$ and one for $x > 0$
 \therefore one negative and one
positive real root

c let $f(x) = e^x + x^2 - 5$
 $f(-3) = 4.05$
 $f(-2) = -0.865$
sign change, $f(x)$ continuous \therefore root

d $f(1) = -1.28$
 $f(2) = 6.39$
 $f(1.2) = -0.240$
 $f(1.3) = 0.359$
 $\therefore 1.2 < \alpha < 1.3$
 $\therefore n = 12$