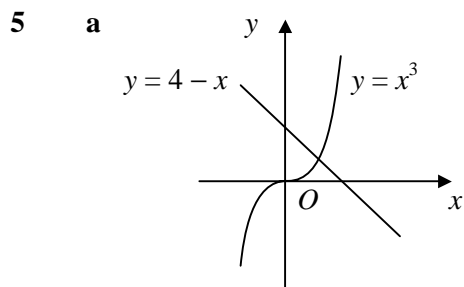


- 1**
- a**  $f(1) = -3$   $f(2) = 7$   
sign change,  $f(x)$  continuous  $\therefore$  root
- c**  $f(-6) = -0.995$   $f(-5) = 0.0135$   
sign change,  $f(x)$  continuous  $\therefore$  root
- e**  $f(0.4) = -0.351$   $f(0.5) = 0.25$   
sign change,  $f(x)$  continuous  $\therefore$  root
- b**  $f(0.5) = 2.89$   $f(1) = -0.298$   
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**  $f(1) = -1$   
 $f(2) = 12.5$   
 $f(1.1) = -0.809$   
 $f(1.2) = -0.426$   
 $f(1.3) = 0.164$   
 $\therefore a = 12$
- c**  $f(-2) = -41$   
 $f(-1) = 3$   
 $f(-1.1) = 0.715$   
 $f(-1.2) = -1.96$   
 $\therefore a = -12$
- e**  $f(5) = 1.19$   
 $f(6) = -1.13$   
 $f(5.5) = 0.928$   
 $f(5.8) = 0.256$   
 $f(5.9) = -0.246$   
 $\therefore a = 58$
- b**  $f(2) = -0.303$   
 $f(3) = 0.292$   
 $f(2.5) = -0.00553$   
 $f(2.6) = 0.0537$   
 $\therefore a = 25$
- d**  $f(11) = 0.723$   
 $f(12) = -0.177$   
 $f(11.7) = 0.0362$   
 $f(11.8) = -0.0425$   
 $\therefore a = 117$
- f**  $f(-3) = 6.42$   
 $f(-2) = -15.0$   
 $f(-2.7) = 2.60$   
 $f(-2.6) = 1.03$   
 $f(-2.5) = -0.75$   
 $\therefore a = -26$

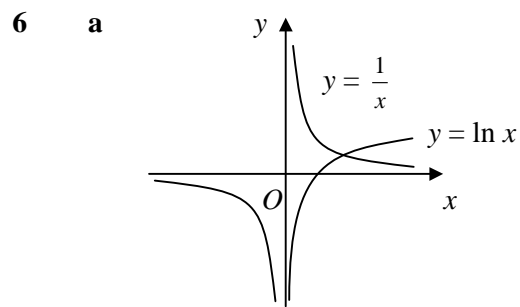


b  $x^3 + x - 4 = 0 \Rightarrow x^3 = 4 - x$   
the graphs  $y = x^3$  and  $y = 4 - x$

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



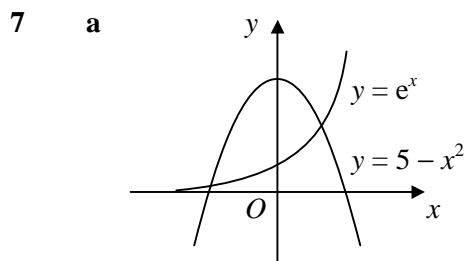
b  $x \ln x - 1 = 0 \Rightarrow x \ln x = 1 \Rightarrow \ln x = \frac{1}{x}$

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

intersect at exactly one point

$\therefore$  one real root

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



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