

## § 2.4 AVERAGE RATE OF CHANGE

# 5, 6, 7, 15, 19, 25, 27, 31

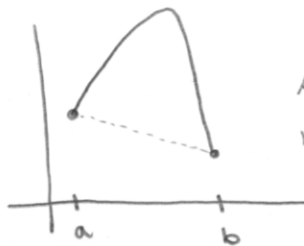
5. (a) YES

(b) YES

6. (a) NO.FOR INCREASING FUNCTIONS,  $f(b) - f(a) > 0$ WHEN  $b - a > 0$ . THUS  $\frac{f(b) - f(a)}{b - a} \oplus > 0$ 

(b) NO

FOR EXAMPLE

AVE. RATE OF CHANGE OVER  $[a, b]$   
IS NEGATIVE. BUT FUNCTION IS  
INCREASING OVER PART OF THIS  
INTERVAL.

7. (a) NET CHANGE =  $f(4) - f(1) = 5 - 3 = \boxed{2}$

(b) AVE RATE OF CHANGE =  $\frac{f(4) - f(1)}{4 - 1} = \boxed{\frac{2}{3}}$

15. (a) NET CHANGE =  $h(6) - h(3) = 66 - 15 = \boxed{51}$

(b) AVE RATE OF CHANGE =  $\frac{h(6) - h(3)}{6 - 3} = \frac{51}{3} = \boxed{17}$

19. (a) NET CHANGE =  $f(3+h) - f(3) = 5(3+h)^2 - 5 \cdot 3^2$   
 $= 5(9+6h+h^2) - 45 = 30h + 5h^2$

(b) AVE RATE OF CHANGE =  $\frac{f(3+h) - f(3)}{3+h-3} = \frac{30h+5h^2}{h} = \frac{h(30+5h)}{h}$   
 $= \boxed{30+5h}$

25. (a) AVERAGE RATE OF CHANGE =  $\frac{f(a+h) - f(a)}{h}$   
 $= \frac{\frac{1}{2}(a+h) + 3 - (\frac{1}{2}a + 3)}{h} = \frac{\frac{1}{2}h}{h} = \boxed{\frac{1}{2}}$

(b)  $f(x) = \frac{1}{2}x + 3$   
 $\uparrow$   
 SLOPE =  $\frac{1}{2}$  = AVE RATE OF CHANGE ✓

27. (i) f (ii) g (iii) 0 AND 1.5

31. (a)  $\frac{P(2001) - P(1998)}{2001 - 1998} = \frac{1591 - 856}{3} = \boxed{245 \text{ PEOPLE PER YEAR}}$

(b)  $\frac{P(2004) - P(2002)}{2004 - 2002} = \frac{826 - 1483}{2} = \boxed{-328.5 \text{ PEOPLE PER YEAR}}$

(c) 1997 - 2001 (d) 2001 - 2006