

## Answers

1. (a)  $\frac{x^2 + 3x}{x - 4}$  (b)  $\frac{x - 4}{x^2 - x}$  (c)  $\frac{5x}{x + 5}$  (d)  $\frac{3x - 1}{x}$
2. (a)  $2(\sqrt{3} - \sqrt{2})$  (b)  $-1 - \sqrt{5}$  (c)  $\frac{7 + 3\sqrt{3} + \sqrt{5} + 2\sqrt{15}}{11}$
3. (a)  $8a^6 b^{-1}$  (b)  $3a^{\frac{1}{2}} b^{\frac{3}{2}}$  (c)  $\frac{2}{3}a^2 b^{-1}$  (d)  $ab^{-1}$  (e)  $a^{-\frac{3}{2}} b$  (f)  $a^{\frac{5}{6}} b^{\frac{1}{2}}$
4. (a) 1 (b)  $-\frac{3}{2}$  (c) 8 (d)  $\pm\frac{4}{25}$
5. (a)  $\log_2(5(x+1))$  (b)  $\log_2 3$  (c) 25
6. (a)  $1/2$  (b)  $-x$  (c)  $2\log_{10} x$
7. (a)  $\frac{bcx}{bc - cy - bz}$  (b)  $\frac{V - 2bc}{2(b + c)}$  (c)  $\frac{-\pi h + \sqrt{\pi^2 h^2 + 2\pi A}}{2\pi}$  (d)  $\frac{A}{1 + nr}$  (e)  $\frac{2x - y}{x + 2y}$  (f)  $\frac{\pi}{\pi - 1}$
8. (a)  $y - (-1) = (x - (-2))^2$  (b)  $y - \frac{3}{8} = -\frac{3}{2}(x - (-\frac{1}{2}))^2$  (c)  $x - (-10) = 9(y - \frac{1}{3})^2$
9. (a)  $x^4(x - 4)(x + 4)$  (b)  $(x - 2)(2x - 5)(2x + 5)$  (c)  $(2x + 3)(4x^2 - 6x + 9)$  (d)  $(x - 1)(x + 1)(x^2 + 1)$
10. (a)  $0, \pm 4$  (b)  $2, \pm\frac{5}{2}$  (c)  $-\frac{3}{2}$
11. (a)  $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}$ , or  $\frac{11\pi}{6}$  (b)  $-\frac{\pi}{2}, \frac{\pi}{6}$ , or  $\frac{5\pi}{6}$  (c)  $\frac{\pi}{6} + 2k\pi$ , or  $\frac{5\pi}{6} + 2k\pi$ , where k is any integer
12. (a)  $-\frac{\sqrt{3}}{2}$  (b)  $-\frac{\sqrt{2}}{2}$  (c)  $-\frac{\pi}{4}$  (d)  $-\frac{\pi}{2}$  (e)  $\frac{\sqrt{2}}{2}$  (f)  $\frac{\pi}{3}$  (g)  $\frac{\sqrt{3}}{3}$  (h)  $\pi$
- 13.
- (a)

(b)

(c)

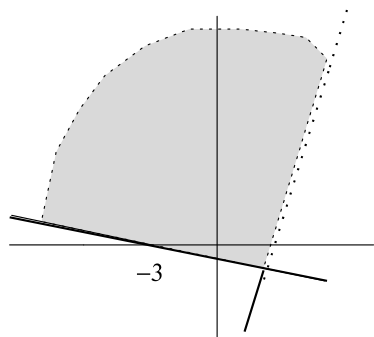
(d)

(e)
14. (a)  $\frac{-3 \pm \sqrt{6}}{2}$  (b)  $\frac{1}{2}$  or  $-3$  (c)  $-\frac{1}{2}$
15. (a)  $-89$  (b)  $x^2 + 3$
16. (a)  $-\frac{1}{3}$  or  $\frac{1}{4}$  (b)  $-\frac{1}{2}, -\frac{1}{2}$ , or  $\frac{1}{3}$
17. (a)  $-3 \leq x \leq 1$  (b)  $x < \frac{2}{3}$  or  $x \geq 1$  (c) all  $x$

18. (a)  $3 \leq x \leq 5$  (b) 2 or  $-\frac{6}{5}$  (c)  $-\frac{4}{3}$  or 2

19. (a)  $7x + 3y = 2$  (b)  $3x + 2y = 1$  (c)  $y = 3$

20. (a)  $(2, -1)$  (b)



21. (a)  $(x - 1)^2 + (y - 2)^2 = 18$  (b)  $(x - \frac{1}{2})^2 + (y - 1)^2 = \frac{5}{4}$

22. (a) centre =  $(-3, 2)$  radius =  $\sqrt{10}$  (b)  $x + 3y = 13$ .

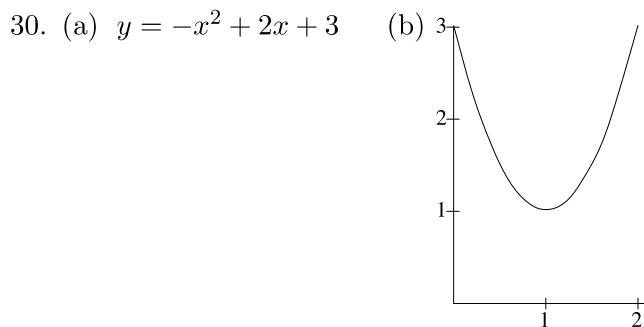
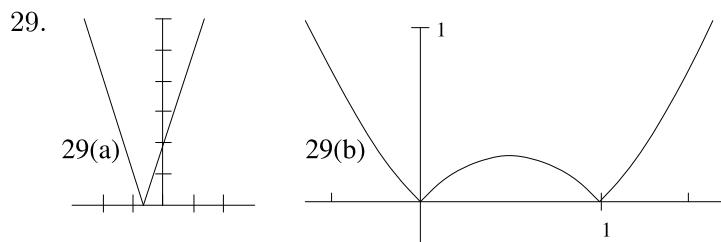
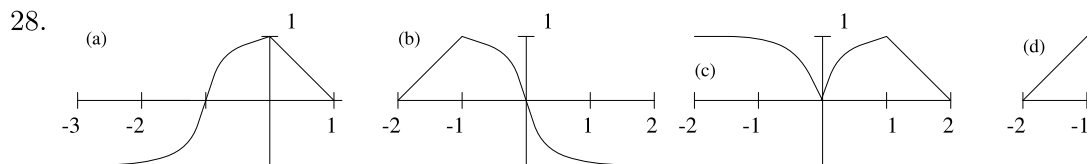
23. (a) 9 (b)  $(x - 5)^2 + (y - 3)^2 = 25$

24.  $8x^2 - 38x + 8y^2 + 20y + 43 = 0$  (a circle).

25. (a)  $x < -2$  or  $x > 1$  (b) i. D: all numbers, R:  $\{7\}$  ii. D: all numbers except  $-\frac{1}{2}$ , R: all numbers except  $\frac{5}{2}$

26. D: all numbers except 0; Range:  $\{1, -1\}$

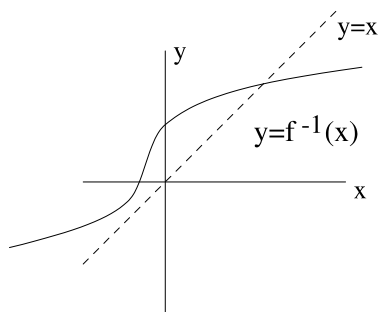
27. (a) 2 (b)  $\frac{-1}{(x+1)(x+h+1)}$  (c)  $2x + h$



31. (a)  $y = x^2 - 3x + 2$  (b)  $y = x(x^2 + 3x + 3)(x + 1)^3$  (c)  $x^2 + y^2 = 1$

32. (a)  $f^{-1}(x) = \frac{x-3}{2}$  (b)  $f^{-1}(x) = \frac{x+2}{5x-1}$  (c)  $-1 + \sqrt{x+2}$ ,  $x > -1$

33.



34. (a)  $x = t \left( \frac{r-h}{h} \right)$  (b)  $x = \frac{rt}{\sqrt{r^2 - h^2}}$

35. (a)  $1 - \frac{\pi}{4}$  (b)  $4r + \pi r$  (c)  $\frac{9\pi}{4}$  (d)  $100\sqrt{5}$  km (e)  $\frac{\pi}{6}$  or  $30^\circ$

36. (a) Use B,  $y = x$ , A and  $\cos 0 = 1$  (b) Use D. (c) Use C. (d) Use (c) then (a).  
 (e) Use (d) then (a). (f) Replace  $x$  by  $\frac{x}{2}$  in (d). (g) Replace  $x$  by  $\frac{x}{2}$  in (e).