Answers

1. (a) $\dfrac{x^2+3x}{x-4}$ (b) $\dfrac{x-4}{x^2-x}$ (c) $\dfrac{5x}{x+5}$ (d) $\dfrac{3x-1}{x}$

2. (a) $2(\sqrt{3}-\sqrt{2})$ (b) $-1-\sqrt{5}$ (c) $\dfrac{7+3\sqrt{3}+\sqrt{5}+2\sqrt{15}}{11}$

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) $\dfrac{bcx}{bc-cy-bz}$ (b) $\dfrac{V-2bc}{2(b+c)}$ (c) $\dfrac{-\pi h+\sqrt{\pi^2h^2+2\pi A}}{2\pi}$ (d) $\dfrac{A}{1+nr}$ (e) $\dfrac{2x-y}{x+2y}$ (f) $\dfrac{\pi}{\pi-1}$

8. (a) $y-(-1)=(x-(-2))^2$ (b) $y-\frac{3}{8}=-\frac{3}{2}(x-(-\frac{1}{2}))^2$ (c) $x-(-10)=9(y-\frac{1}{3})^2$

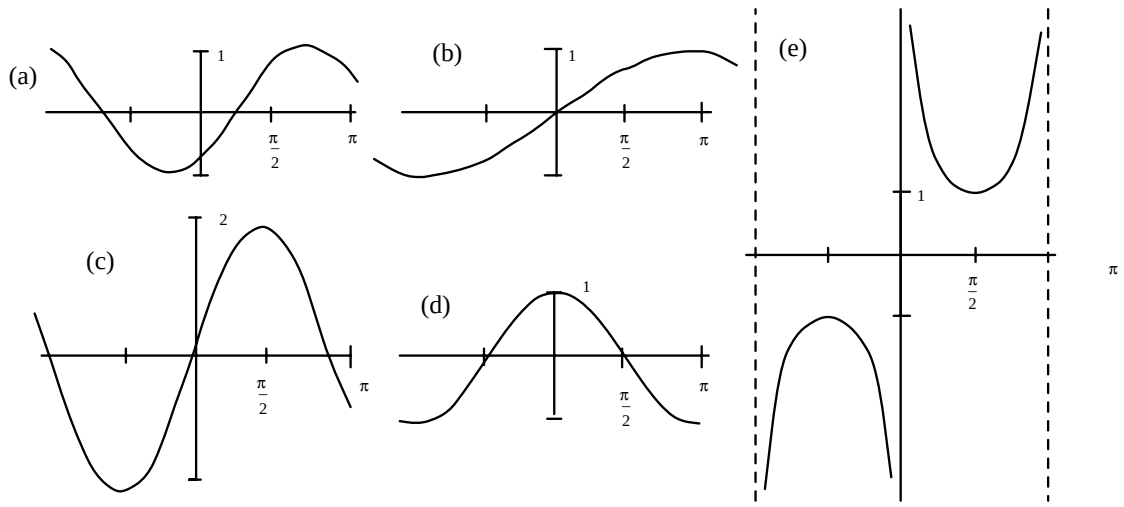
9. (a) $x^4(x-4)(x+4)$ (b) $(x-2)(2x-5)(2x+5)$ (c) $(2x+3)(4x^2-6x+9)$ (d) $(x-1)(x+1)(x^2+1)$

10. (a) $0,\pm4$ (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) $-\frac{\pi}{2}+2k\pi$, $\frac{\pi}{6}+2k\pi$, 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) π

13.



14. (a) $\dfrac{-3\pm\sqrt{6}}{2}$ (b) $\frac{1}{2}$ or -3 (c) $-\frac{1}{2}$

15. (a) -89 (b) x^2+3

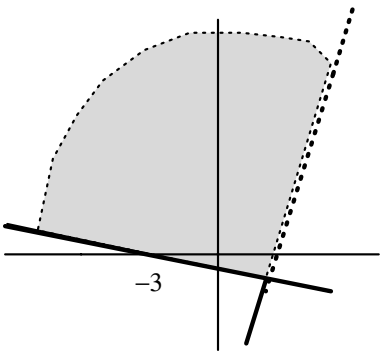
16. (a) $-\frac{1}{3}$ or $\frac{1}{4}$ (b) $-\frac{1}{2}$, $-\frac{1}{2}$, or $\frac{1}{3}$

17. (a) $-3\le x\le 1$ (b) $x<\frac{2}{3}$ or $x\ge 1$ (c) all x

18. (a) $3\le x\le 5$ (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) $(x-5)^2 + (y-3)^2 = 25$

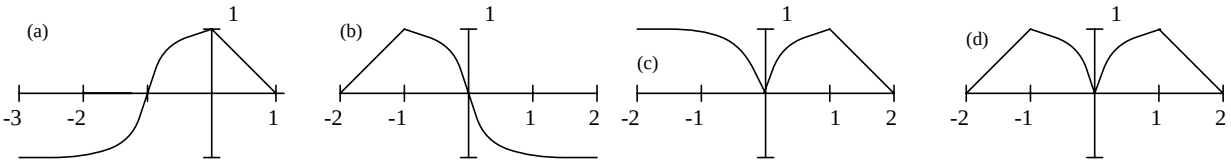
24. $8x^2 - 38x + 8y^2 + 20y + 43 = 0$ (a circle).

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 $\frac{5}{2}$

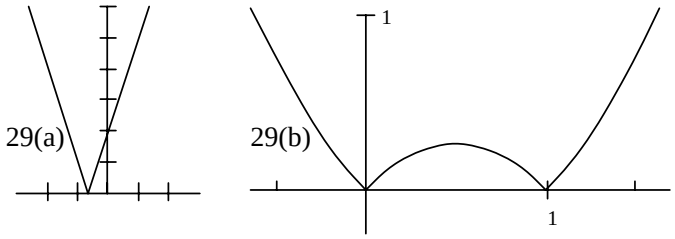
26. D: all numbers except 0; Range: $\{1, -1\}$

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

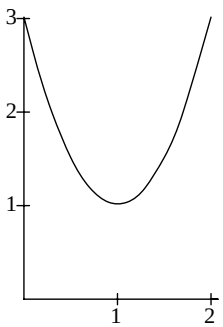
28.



29.



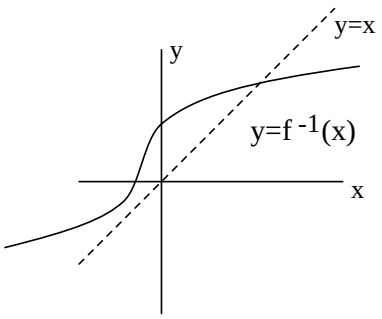
30. (a) $y = -x^2 + 2x + 3$ (b)



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

33.



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

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°

36. (a) $1 = \cos(x-x) = \ldots$ (b) Use D. (c) Use C. (d) Use (c) then (a).
(e) Substitute $\frac{x}{2}$ into (d). (g) Substitute $\frac{x}{2}$ into (e).