



Solutions

3.1 Introduction to Functions

1. (a) Yes
(b) Yes
(c) No
(d) No
(e) Yes
(f) No
2. (a) Neither
(b) Surjective
(c) Bijective
(d) Injective
(e) Injective
(f) Neither
(g) Bijective
(h) Bijective

3.2 Composition of Functions

1. i. 7
ii. -32
iii. 15
iv. $8 - 10x$
v. $x = -2$
2. i. 3
ii. 11
iii. 14
iv. 195
v. 63
vi. 35
vii. 74
viii. 15
3. (a) $r = 1.5t$ m
(b) $A = 2.25\pi t^2$ m². This function describes the area of the ripple for a given time (t).
(c) $t = 10$ s.
4. (a) $r = 3t$ cm
(b) $V = 36\pi t^3$ cm³
(c) $t = 3$ s
5. i. $f^2(x) = 16x - 15$
ii. $f^3(x) = 64x - 63$
iii. $f^4(x) = 256x - 255$
iv. $f^n(x) = 4^n x - 4^n + 1$

3.3 Inverse Functions

1. i. $f^{-1}(x) = \frac{x}{2}$
ii. $g^{-1}(x) = x - 4$
iii. $h^{-1}(x) = \frac{x+1}{2}$
iv. $k^{-1}(x) = \frac{x-5}{3}$
v. $f^{-1}(x) = \frac{2-x}{3}$
vi. $g^{-1}(x) = \frac{4}{x}$
vii. $h^{-1}(x) = \frac{1+2x}{x}$
viii. $k^{-1}(x) = \frac{5}{1-x}$
ix. $g^{-1}(x) = \frac{2x}{3x-2}$
x. $f^{-1}(x) = \frac{1}{x-1}$

Inverse Functions ctd...

2. i. $f^{-1}(x) = \sqrt{x+19} - 3, \quad x \geq -19$
ii. $f^{-1}(x) = \sqrt{x+9} + 2, \quad x \geq -9$
iii. $f^{-1}(x) = \sqrt{x+12} + 5, \quad x \geq -12$





iv. $f^{-1}(x) = \sqrt{x+8} - 4, \quad x \geq -8$

3. $f^{-1}(x) = 4 - 2x$

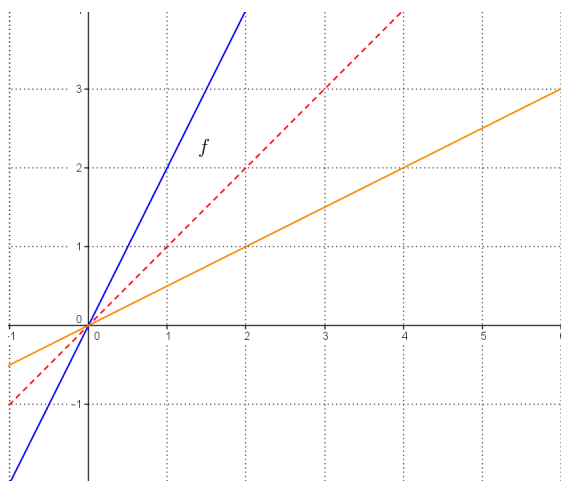
DOMAIN: $0 \leq x \leq \frac{5}{3}$

RANGE: $-1 \leq y \leq 4$

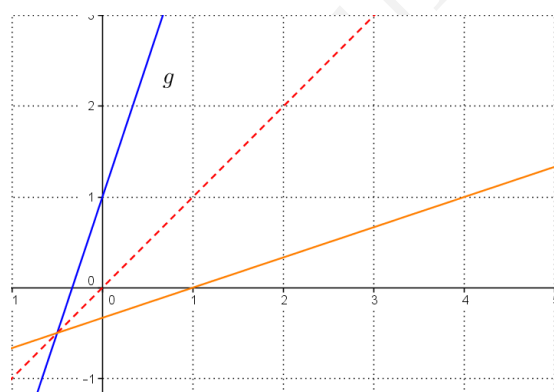
4. $A : x \leq 2$

3.4 Graphing Inverse Functions

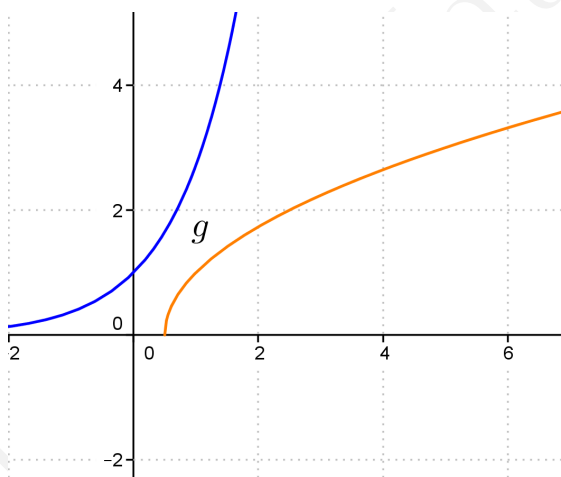
1. .



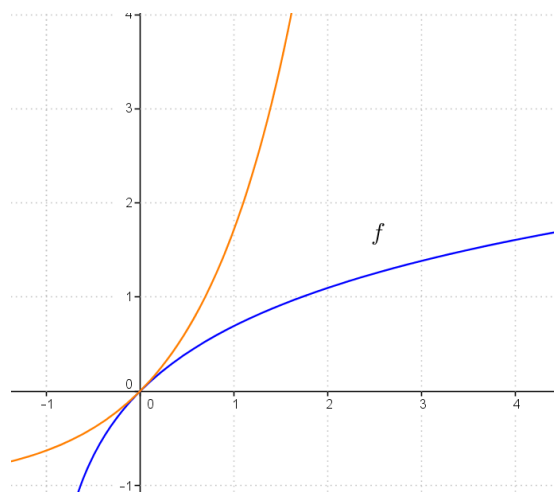
(a)



(b)



(c)



(d)





3.5 Turning Points

1. (a) $(-3, 1)$ min
- (b) $(-4, -12)$ min
- (c) $(4, 21)$ max
- (d) $(-5.5, -20.25)$ min
- (e) $(-1, 10)$ min
- (f) $(1, 4)$ max

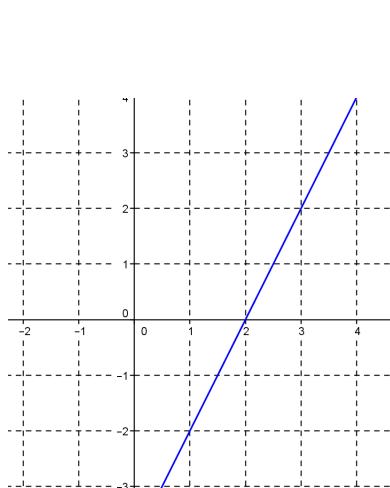
3.6 Asymptotes

1. (a) $\frac{1}{7}$
- (b) $\frac{3}{2}$
- (c) $\frac{1}{3}$
- (d) $\frac{3}{4}$
- (e) 0
- (f) 0
2. (a) $x = 5$ and $y = 0$
- (b) $x = 0$ and $y = \frac{3}{2}$
- (c) $x = 3$ and $y = 2$
- (d) $x = \frac{2}{3}$ and $y = \frac{5}{3}$

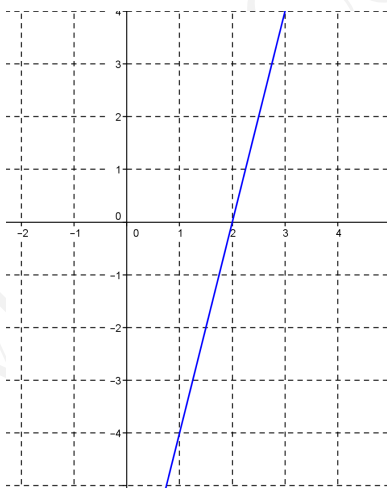
3. (a) $(0, 0)$
- (b) $x = 4$ and $y = 1$
4. ASYMPTOTES: $x = 3$ and $y = 1$
- INTERCEPTS: $(-5, 0)$ and $(0, -\frac{5}{3})$

3.7 Graphing $\frac{dy}{dx}$

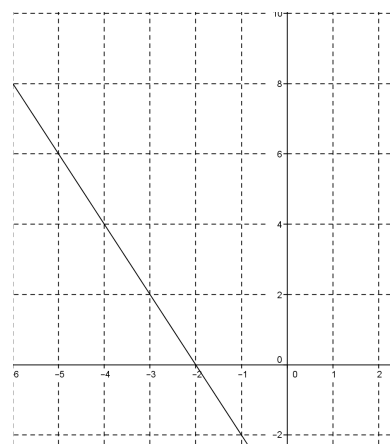
1. .



(a)

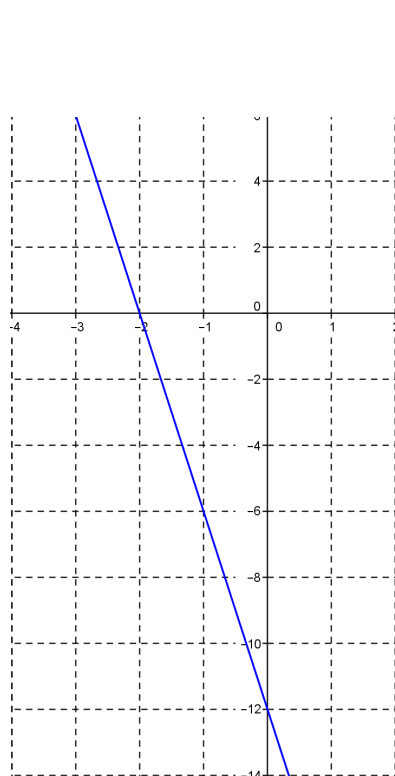


(b)

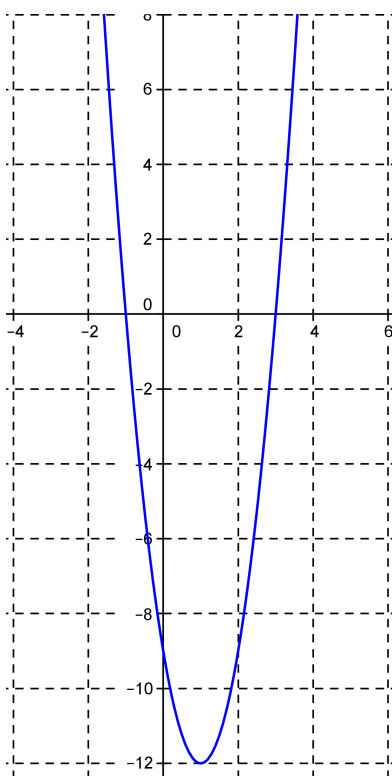


(c)

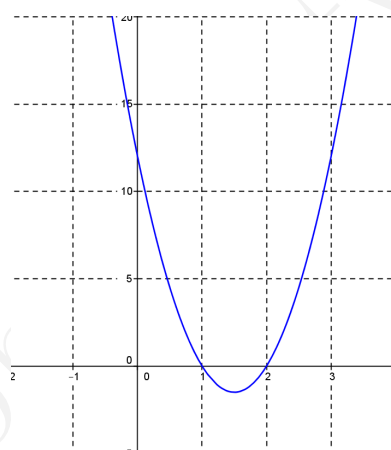




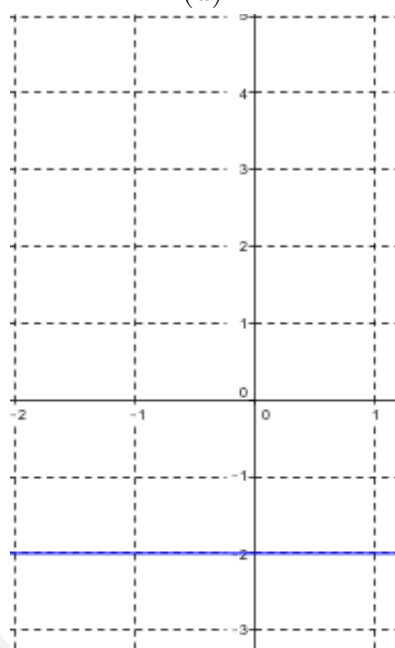
(d)



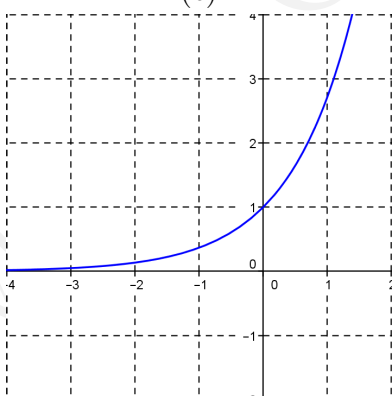
(e)



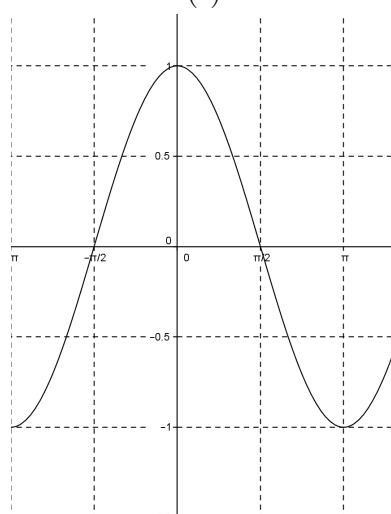
(f)



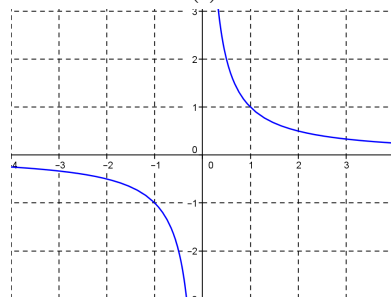
(g)



(h)



(i)



(j)

