Section 1: algebra and graphing

Part 1: solve for x

1. $x = 3$

2. $t = \pm 3$

3. $x = \pm 3i$

4. $t = \frac{v_f - v_i}{a}$

5. $a = \frac{(1-\mu)m_2 - m_1}{m_2 + m_1} g$

6. $x = 2$

7. $t = -2$

8. $x = 1$ and $x = -\frac{1}{3}$

9. $x = \frac{-1+i}{3}$ and $x = \frac{-1-i}{3}$

10. $x = \frac{-1+i}{3}$ and $x = \frac{-1-i}{3}$ and $x = 0$

11. $t = 0.759 \ldots$

12. $x = 0.451 \ldots$

13. $x = -0.786 \ldots$ and $x = 0.286 \ldots$

14. $x = 2.154 \ldots$

15. $x = 80$

16. $x = 20.085 \ldots$

17. $x = 2.718 \ldots$

Part 2: solve for the unknown coefficients

18. $m = 3$ and $b = 1$

19. $a = 2$ and $b = 4$

20. $v = \frac{y_2 - y_1}{t_2 - t_1}$ and $y_0 = \frac{y_1 t_2 - y_2 t_1}{t_2 - t_1}$

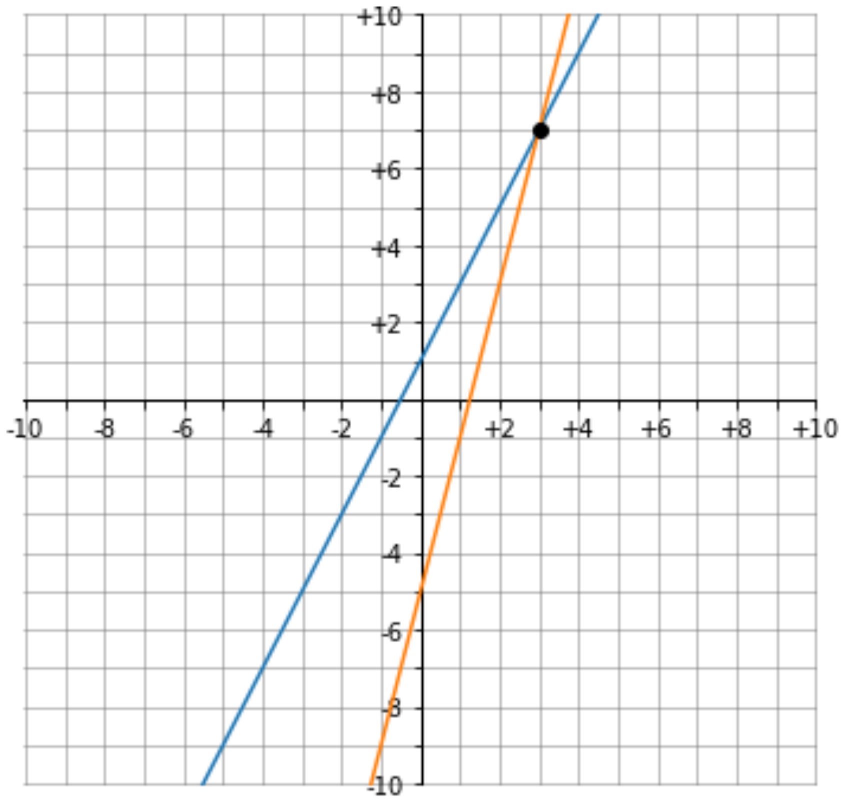
21. $a = 3$ and $b = -2$ and $c = -1$

22. $a = 6$ and $b = -4$ and $c = -2$

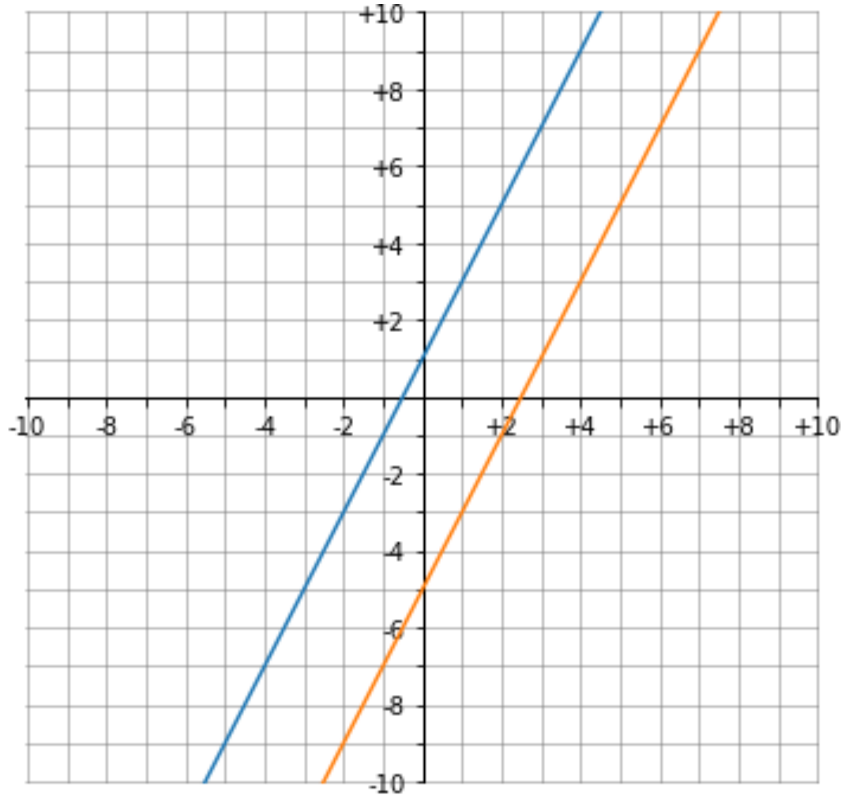
23. $a = 6$ and $b = -4$ and $c = -2$

Part 3: using algebra find the intersection(s) of two curves, then plot the functions and verify.

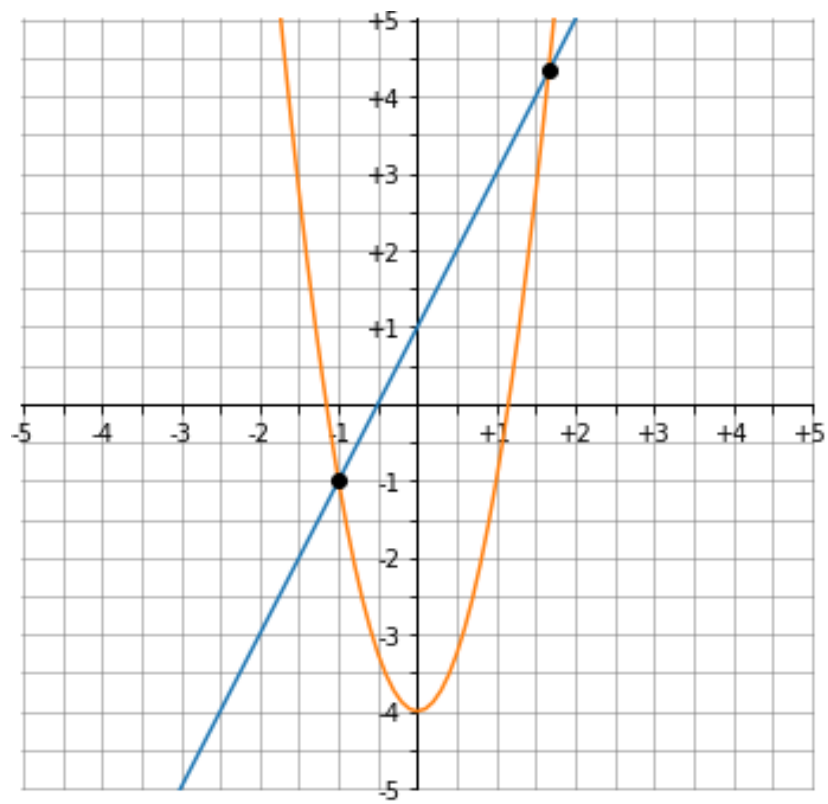
24. $x = 3,\ y = 7$



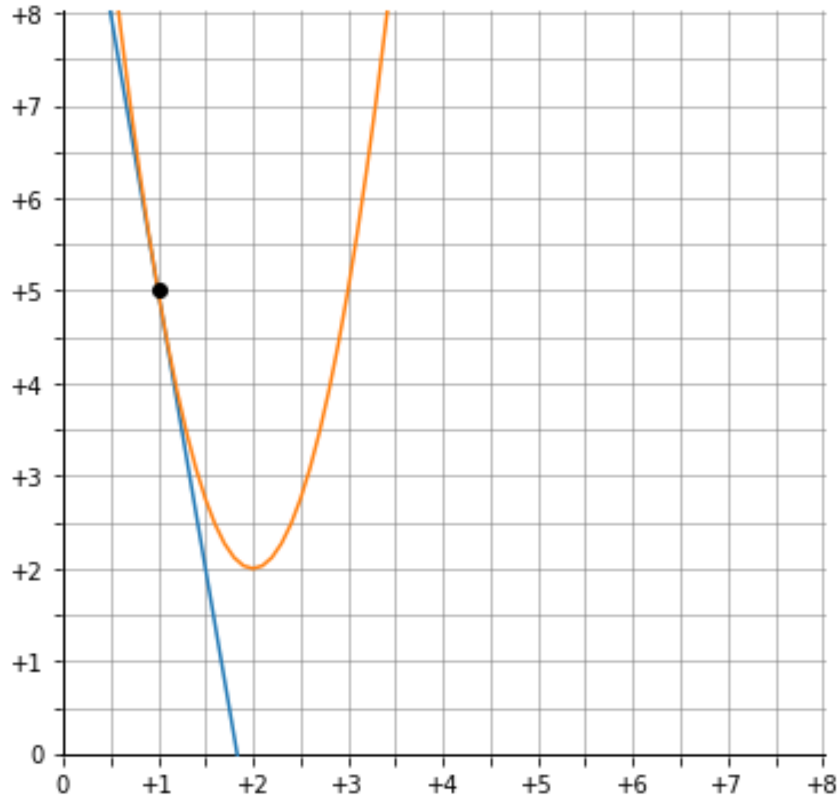
25. no solution



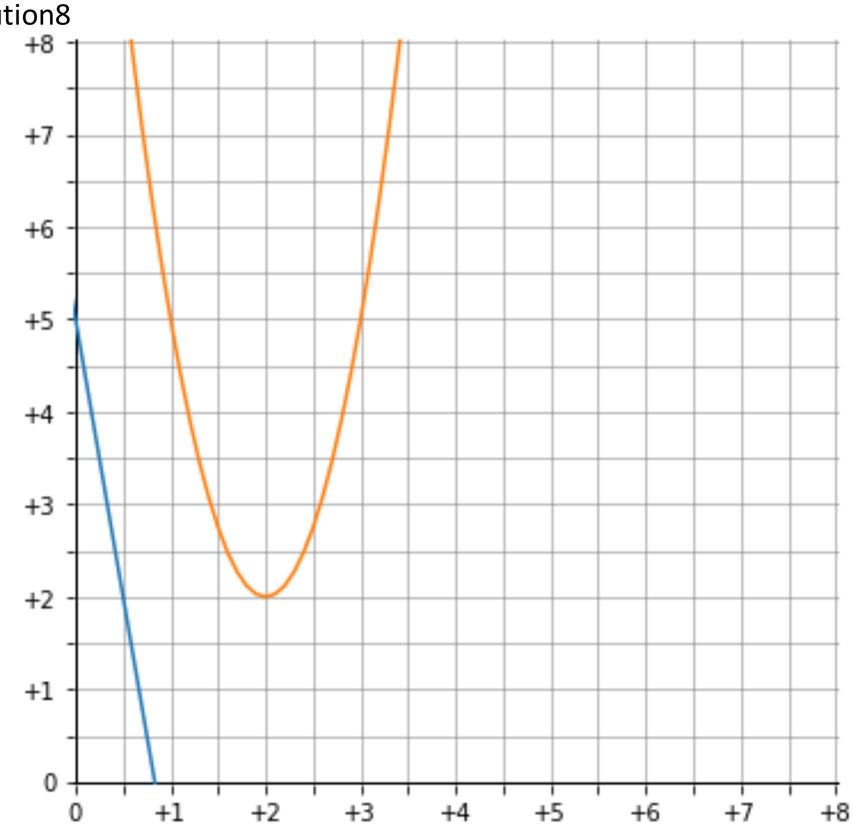
26. $x = -1,\ y = -1$ and $x = \frac{5}{3},\ y = \frac{13}{3}$



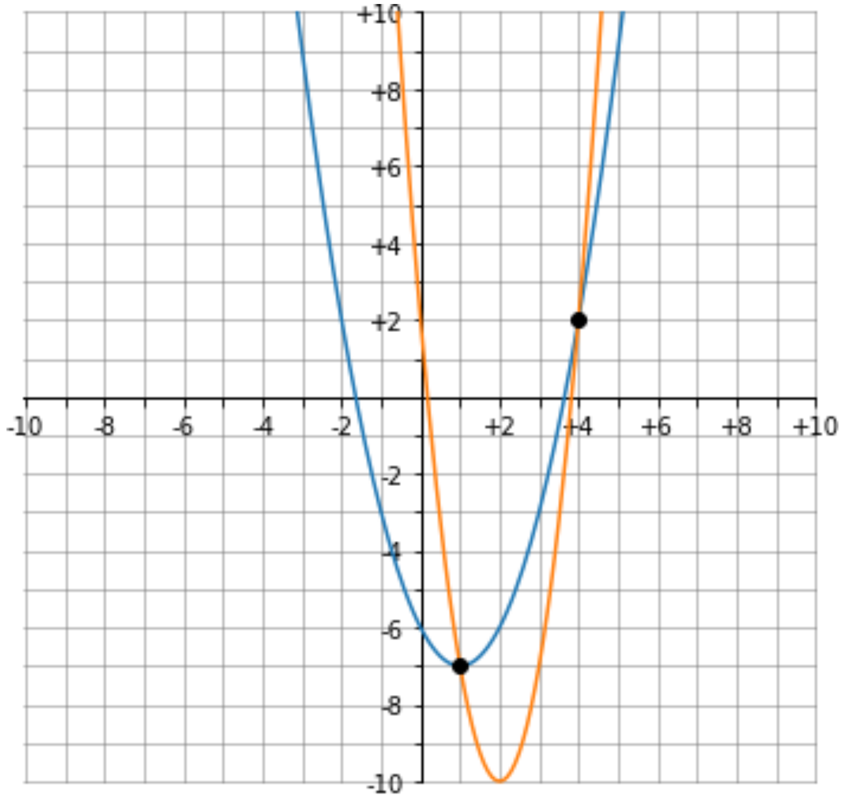
27. $x = 1,\ y = 5$



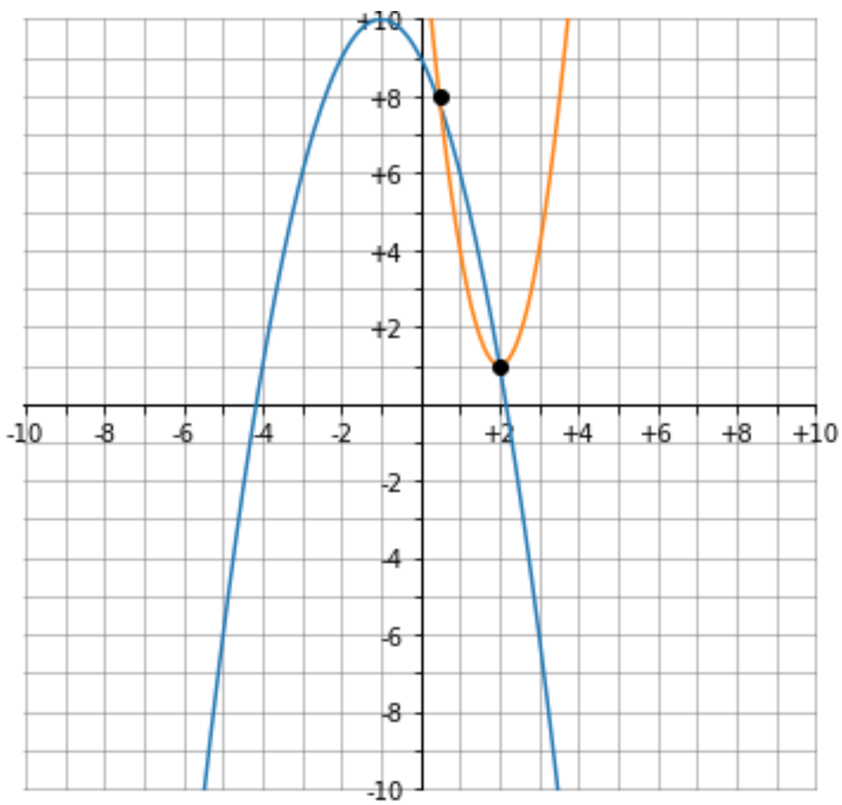
25. no solution8



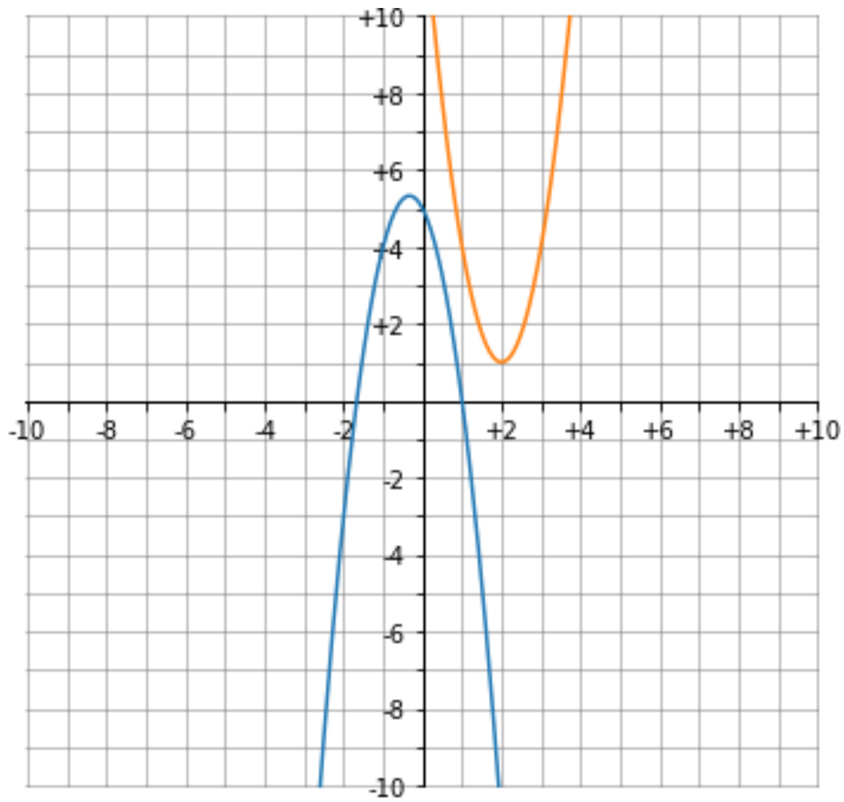
29. $x = 1,\ y = -7$ and $x = 4,\ y = 2$



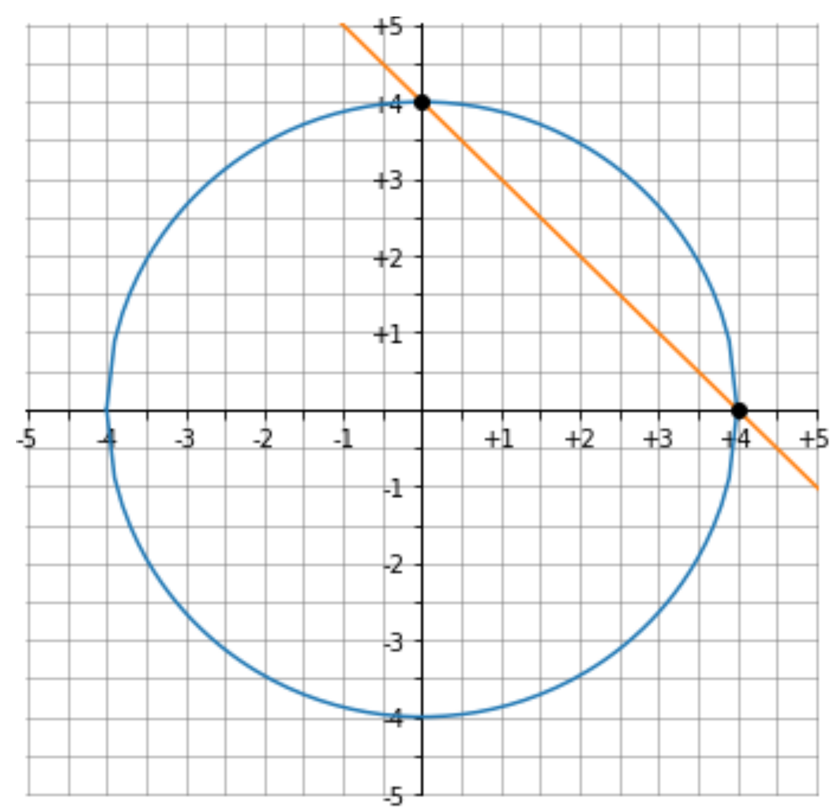
30. $x = \frac{1}{2},\ y = 8$ and $x = 2,\ y = 1$



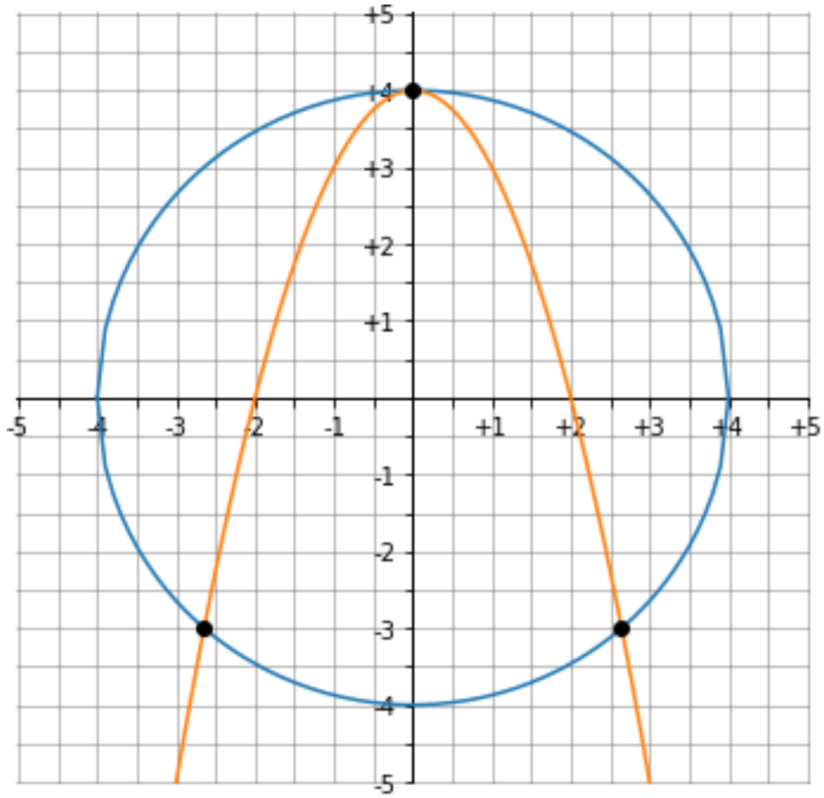
31. no solution



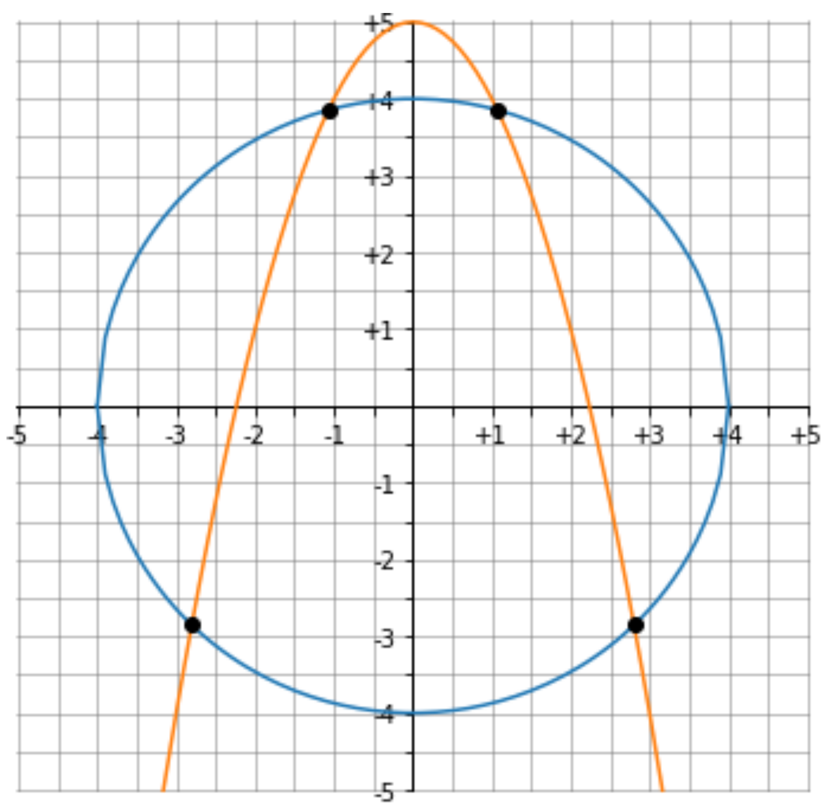
32. $x = 0,\ y = 4$ and $x = 4,\ y = 0$



33. $x = -2.646,\ y = -3$ and $x = +2.646,\ y = -3$ and $x = 0,\ y = 4$



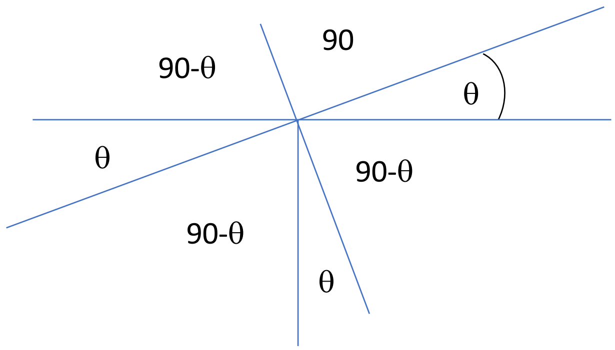
34. $x = -2.802,\ y = -2.854$ and $x = -1.070,\ y = +3.855$ and $x = +2.802,\ y = -2.854$ and $x = +1.070,\ y = +3.855$



Section 2: geometry and trigonometry

Part 1: basic geometry

1.



2. $s = r\,\theta = (3)\left(\frac{\pi}{3}\right) = \pi$ since $60° = \frac{\pi}{3}$

3. $b = 3a$ $c = \sqrt{10}\,a$ and $\text{Area} = 18\,a^2$

4. $\sin(\theta) = \frac{a}{c}$

5. $\cos(\theta) = \frac{b}{c}$

6. $\tan(\theta) = \frac{a}{b}$

7. $\csc(\theta) = \frac{c}{a}$

8. $\sec(\theta) = \frac{c}{b}$

9. $\cot(\theta) = \frac{b}{a}$

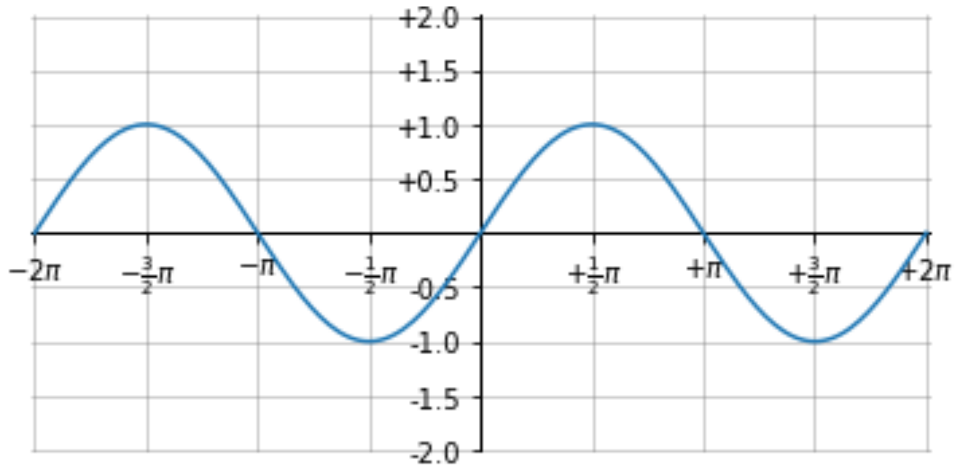
10. $\arcsin\left(\frac{a}{c}\right) = \theta$

11. $\arccos\left(\frac{b}{c}\right) = \theta$

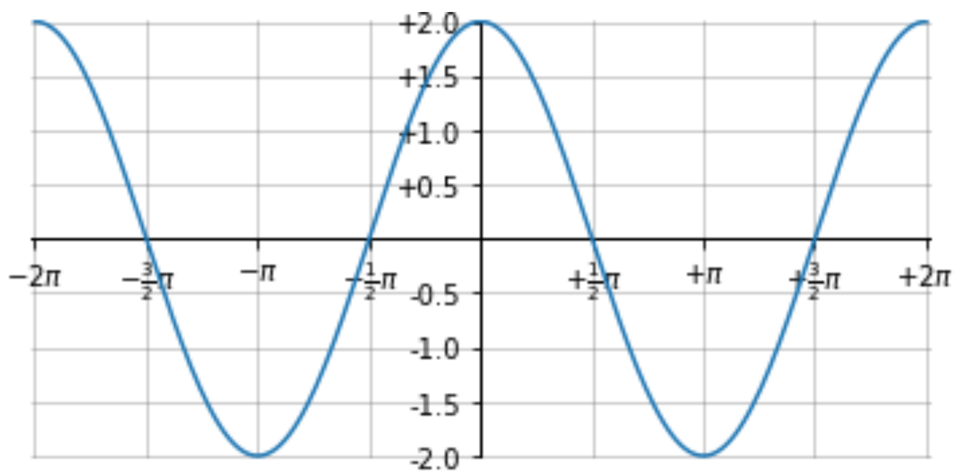
12. $\arctan\left(\frac{a}{b}\right) = \theta$

Part 3: Plot the following functions.

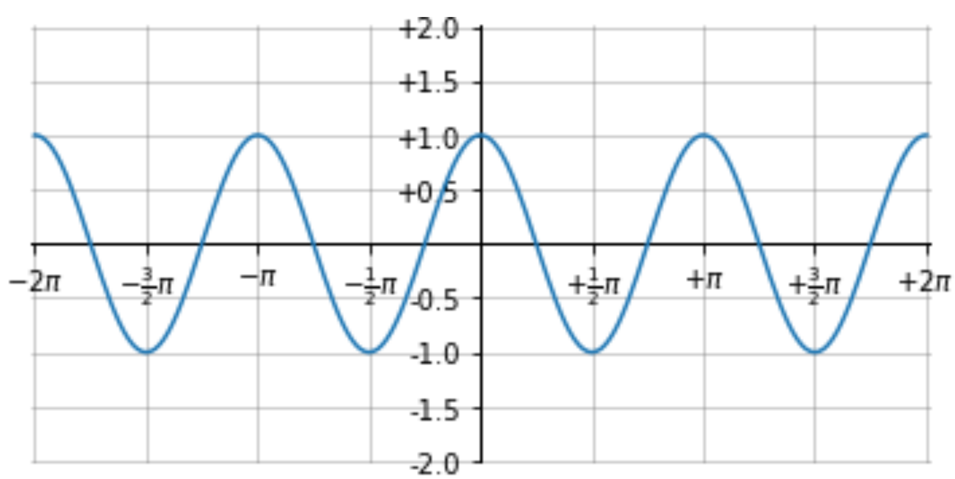
13. $y(x) = \sin(x)$



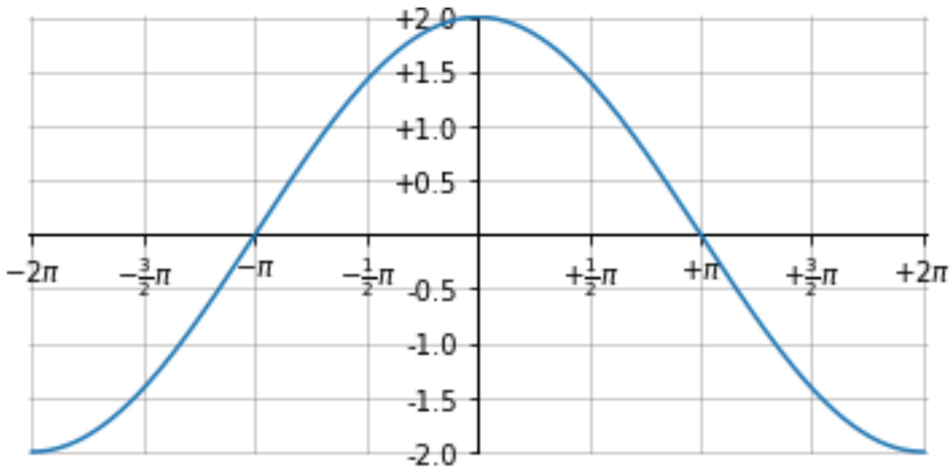
14. $y(x) = 2\cos(x)$



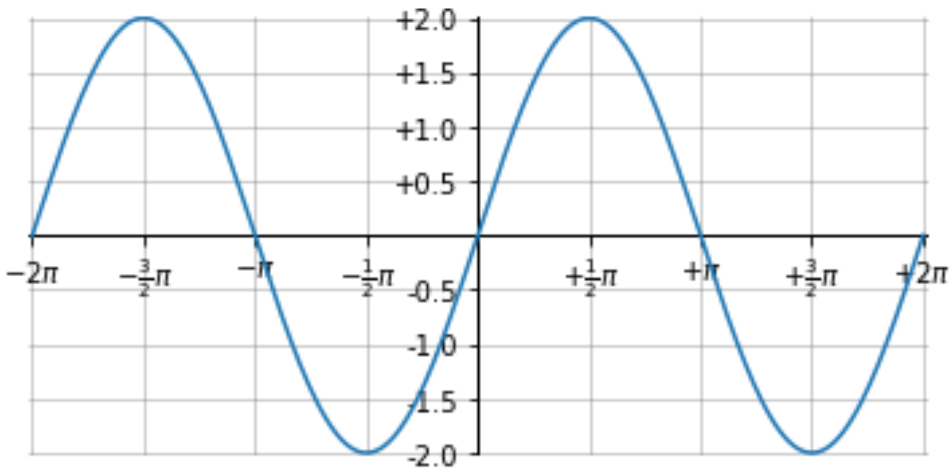
15. $y(x) = \cos(2\,x)$



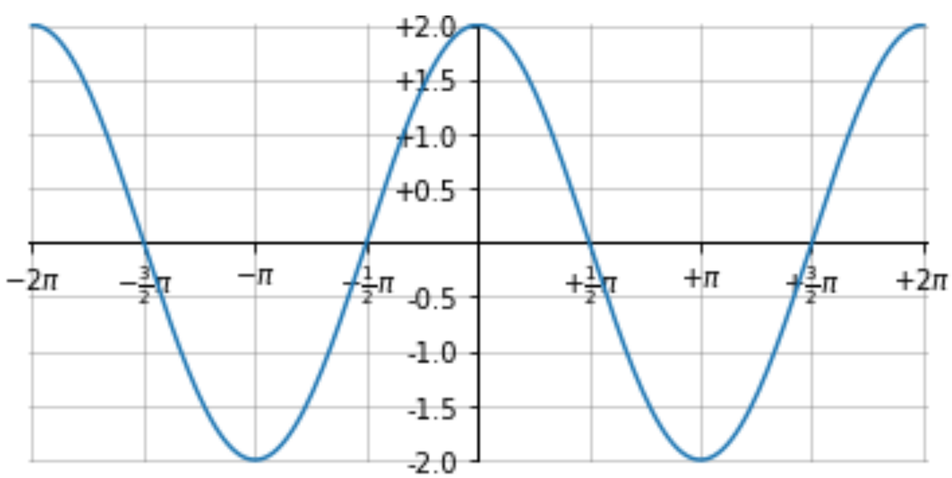
16. $y(x) = 2\cos\left(\frac{x}{2}\right)$



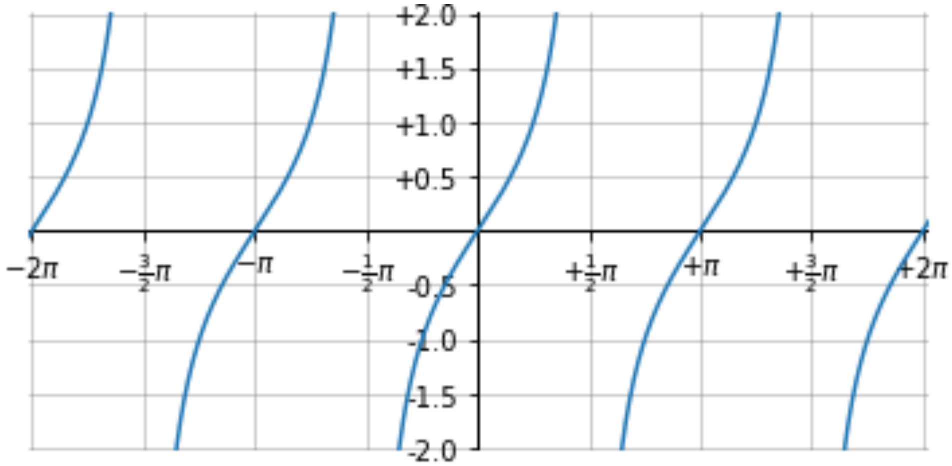
17. $y(x) = 2\cos\left(x - \frac{\pi}{2}\right)$



18. $y(x) = 2\sin\left(x + \frac{\pi}{2}\right)$



19. $y(x) = \tan(x)$



Section 3: calculus

Part 1: calculate the derivative of each function

1. $\frac{dy}{dx} = 3$

2. $\frac{dy}{dx} = 6x + 2$

3. $\frac{dy}{dx} = 3\,x^{0.5}$

4. $\frac{dy}{dx} = -\frac{2}{x^2}$

5. $\frac{dy}{dx} = -\frac{3}{x^{2.5}}$

6. $\frac{dy}{dt} = 2$

7. $\frac{df}{dt} = 6\,t^{0.5}$

8. $\frac{df}{dt} = \frac{3}{t^{2.5}}$

Part 2: find the coordinates of the minima or maxima of the function

9. none

10. $x = -3, f = 23$

11. $x = -\frac{1}{3}, f = \frac{41}{27}$ and $x = 1, f = 1$

12. none

13. $x = \frac{4}{3}, f = -\frac{9}{8}$

Part 3: calculate the velocity given the position

14. $v_y(t) = 2 \text{ m/s}$

15. $v_y(t) = (4 \text{ m}/s^2)\ t + (3 \text{ m/s})$

16. $v_x(t) = (3 \text{ m}/s^3)\ t^2 - (2 \text{ m}/s^2)\ t + (1 \text{ m/s})$

17. $v_x(t) = -(4 \text{ m } s^2)\ t^{-3} + (3 \text{ m s})\ t^{-2}$

Part 4: calculate the acceleration given the position

18. $a_y(t) = 0 \text{ m}/s^2$

19. $a_y(t) = 4 \text{ m}/s^2$

20. $a_x(t) = (3 \text{ m}/s^3)\ t - 2 \text{ m}/s^2$

21. $a_x(t) = (12 \text{ m } s^2)\ t^{-4} - (9 \text{ m s})\ t^{-3}$

Part 5: calculate the area under the curve

22. $\int_0^1 x\ dx = \frac{1}{2}$

23. $\int_{-1}^1 x\ dx = 0$

24. $\int_0^2 (2x + 3)\ dx = 10$

25. $\int_{-2}^2 (2x + 3)\ dx = 12$

26. $\int_0^2 (2x^2 + 3x + 2)\ dx = 18$

27. $\int_{-2}^2 (2x^2 + 3x + 2)\ dx = 24$

Part 6: calculate the velocity given the acceleration

28. $v_x(t) = (2\ \mathrm{m}/s^2)\ t - 3\ \mathrm{m/s}$

29. $v_x(t) = (2\ \mathrm{m}/s^2)\ t - 3\ \mathrm{m/s}$

30. $v_y(t) = (2\ \mathrm{m}/s^3)\ t^2 + (3\ \mathrm{m}/s^2)\ t + 2\ \mathrm{m/s}$

Part 7: calculate the position given the acceleration

31. $x(t) = (2\ \mathrm{m}/s^2)\ t^2 - (3\ \mathrm{m/s})\ t + 2\ \mathrm{m}$

32. $x(t) = (2\ \mathrm{m}/s^2)\ t^2 - (3\ \mathrm{m/s})\ t + 1\ \mathrm{m}$

33. $y(t) = \left(\frac{1}{3}\ \mathrm{m}/s^3\right)\ t^3 - (3\ \mathrm{m/s})\ t + 1\ \mathrm{m}$

34. $y(t) = \left(\frac{1}{3}\ \mathrm{m}/s^3\right)\ t^3 - (1\ \mathrm{m/s})\ t + 1\ \mathrm{m}$

35. $y(t) = \left(\frac{1}{3}\ \mathrm{m}/s^3\right)\ t^3 + \left(\frac{2}{3}\mathrm{m/s}\right)\ t + 1\ \mathrm{m}$