

Example Worksheet 1 Solutions

1 Linear equations

1.

$$E = \frac{-T + 23}{F + 15}$$

2.

$$q = \frac{E - 15}{T + 12}$$

3.

$$v = \frac{y + 15}{f - 18}$$

4.

$$x = -\frac{21}{H + 5}$$

5.

$$n = \frac{c - 12}{B + 11}$$

6.

$$b = \frac{-A + g}{T - 11}$$

7.

$$X = -\frac{a}{13} - 1$$

8.

$$b = \frac{h + 2}{-T + z}$$

9.

$$d = -\frac{j + 3}{K - 10}$$

10.

$$q = \frac{g}{13} - \frac{r}{13}$$

11.

$$d = \frac{-A + 21}{S - r}$$

12.

$$u = -\frac{15}{28}$$

13.

$$Y = -\frac{E}{6} - \frac{17}{6}$$

14.

$$j = -\frac{14}{t+13}$$

15.

$$W = \frac{-C+c}{g+26}$$

16.

$$r = \frac{t+2}{H+19}$$

17.

$$N = -\frac{18}{31}$$

18.

$$v = -\frac{11}{37}$$

19.

$$d = -\frac{9}{8}$$

20.

$$x = -\frac{S+25}{N-W}$$

2 Quadratic equations

1.

$$y = -\frac{1}{16} + \frac{\sqrt{769}}{16}, y = -\frac{\sqrt{769}}{16} - \frac{1}{16}$$

2.

$$y = -\frac{1}{2} - \frac{3i}{10}\sqrt{10}, y = -\frac{1}{2} + \frac{3i}{10}\sqrt{10}$$

3.

$$x = -\frac{1}{26} - \frac{\sqrt{467}i}{26}, x = -\frac{1}{26} + \frac{\sqrt{467}i}{26}$$

4.

$$y = -22, y = -6$$

5.

$$x = 16, x = 23$$

6.

$$x = 3, x = 14$$

7.

$$x = -26, x = 20$$

8.

$$y = -26, y = 14$$

9.

$$y = 11, y = 21$$

10.

$$y = 0, y = \frac{24}{17}$$

11.

$$y = -6, y = -2$$

12.

$$y = -14, y = 22$$

13.

$$x = -\frac{2}{3} + \frac{\sqrt{226}}{6}, x = -\frac{\sqrt{226}}{6} - \frac{2}{3}$$

14.

$$y = \frac{2}{43} + \frac{\sqrt{262}}{43}, y = -\frac{\sqrt{262}}{43} + \frac{2}{43}$$

15.

$$x = 7, x = 11$$

16.

$$x = -19, x = 13$$

17.

$$y = 4, y = 23$$

18.

$$y = -\frac{1}{14} - \frac{3i}{14}\sqrt{31}, y = -\frac{1}{14} + \frac{3i}{14}\sqrt{31}$$

19.

$$x = -\frac{5}{4}, x = 0$$

20.

$$x = -26, x = 8$$

3 Differentiation

1.

$$\frac{e^x + \frac{1}{x}}{\tan(x)} + \frac{1}{\tan^2(x)} (e^x + \log(x)) (-\tan^2(x) - 1)$$

2.

$$-(\sqrt{z} + \sin(z)) e^{-z} + \left(\cos(z) + \frac{1}{2\sqrt{z}} \right) e^{-z}$$

3.

$$\frac{-10y + 1}{\tan(y)} + \frac{1}{\tan^2(y)} (-\tan^2(y) - 1) (-5y^2 + y - 21)$$

4.

$$(-48y^2 + \cos(y) - 19) e^{-y} - (-16y^3 - 19y + \sin(y) + 23) e^{-y}$$

5.

$$\frac{(46z - 11)(\sqrt{z} - 10z^3 + 15z^2 + z)}{(-23z^2 + 11z + 12)^2} + \frac{-30z^2 + 30z + 1 + \frac{1}{2\sqrt{z}}}{-23z^2 + 11z + 12}$$

6.

$$-\frac{1}{11x^2} \left(-\sin(x) + \frac{1}{x} \right) + \frac{2}{11x^3} (\log(x) + \cos(x))$$

7.

$$\frac{(y + e^y)(-51y^2 + 24)}{(17y^3 - 24y - 10)^2} + \frac{e^y + 1}{17y^3 - 24y - 10}$$

8.

$$-(z + \tan(z)) e^{-z} + (\tan^2(z) + 2) e^{-z}$$

9.

$$\frac{1}{-8y + 5} (\cos(y) + \tan^2(y) + 1) + \frac{8(\sin(y) + \tan(y))}{(-8y + 5)^2}$$

10.

$$\frac{18y^2 + 72y}{\sin(y)} - \frac{\cos(y)}{\sin^2(y)} (6y^3 + 36y^2)$$

4 Compute the integral

1.

$$-7z + C$$

2.

$$9y^2 + C$$

3.

$$-\frac{13z^2}{2} - 22z + C$$

4.

$$2z + C$$

5.

$$-\frac{17y^4}{4} - \frac{20y^3}{3} - 26y + C$$

6.

$$\frac{25y^2}{2} - y + C$$

7.

$$-\frac{23y^2}{2} + C$$

8.

$$4z^4 - 6z^2 + C$$

9.

$$4z^2 + 6z + C$$

10.

$$5z + C$$

5 Compute the integral

1.

$$\frac{64y^{\frac{8}{3}}}{3} - \frac{161y^{\frac{7}{3}}}{45} + C$$

2.

$$\frac{7}{18\sqrt{z}} + C$$

3.

$$\frac{21z^{\frac{3}{4}}}{4} + \frac{z^{\frac{3}{2}}}{4} + \frac{7}{8\sqrt[4]{z}} + C$$

4.

$$-\frac{13}{18\sqrt{y}} + C$$

5.

$$-\frac{14}{3z^{\frac{2}{3}}} + C$$

$$6. \quad \frac{102z^{\frac{8}{5}}}{25} + C$$

$$7. \quad \frac{35y^{\frac{7}{2}}}{8} + C$$

$$8. \quad -\frac{15z^{\frac{9}{4}}}{4} + C$$

$$9. \quad -\frac{42z^{\frac{7}{5}}}{5} - \frac{28z^{\frac{4}{5}}}{5} + C$$

$$10. \quad -\frac{7z^{\frac{7}{2}}}{8} + \frac{25z^{\frac{5}{2}}}{8} + C$$

6 Compute the integral

$$1. \quad \frac{1}{2} \log (\tan ^2 (\log (z))+1)+C$$

$$2. \quad -8 z^2 \sqrt{-12 z^2-11 z-10}-\frac{22 z}{3} \sqrt{-12 z^2-11 z-10}-\frac{20}{3} \sqrt{-12 z^2-11 z-10}+C$$

$$3. \quad -7 \log ^2(z)+C$$

$$4. \quad \frac{19}{4} e^{4 y}-2 e^y+C$$

$$5. \quad \frac{1}{2} \log (\tan ^2 (\log (y))+1)+C$$

$$6. \quad \frac{390963 z^8}{2}-905388 z^7+2313288 z^6-3787080 z^5+\frac{8771821 z^4}{2}-3593194 z^3+2083784 z^2-774972 z+C$$

$$7. \quad \frac{e^{2 y}}{2}+C$$

$$8. \quad \frac{2\left(e^y\right)^{\frac{3}{2}}}{3}+C$$

9.

$$-\cos(\sqrt{y}) + C$$

10.

$$\frac{20}{3} \sin^3(z) + C$$