**MATHEMATICS 201-009-50**
Precalculus
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# IV - Equations

1. Solve the following equation.
   a) $4x-7=8$
   b) $2x-1=7x+5$
   c) $\frac{1}{3}x-4=x+\frac{1}{2}$
   d) $\frac{1}{2}x+\frac{1}{3}=\frac{1}{4}x-\frac{1}{6}$
   e) $3(2x-1)+4(x-1)=3x+7$
   f) $(x+2)^2-3x+4=x(x-2)$
   g) $(2x+1)^2-(x+1)^2=3(x+4)^2$
   h) $\frac{1}{x+1}=\frac{3}{x+2}$
   i) $\frac{2}{x-1}+\frac{3}{x+1}=\frac{2}{x^2-1}$
   j) $\frac{3x-2}{x+5}=\frac{12x-1}{4x+1}$
   k) $\frac{2}{t}-3=\frac{3}{4t}$
   l) $\frac{5x-1}{x-2}+2=\frac{4}{x-2}$
   m) $\frac{1}{2x+1}-\frac{1}{3x+5}=\frac{1}{6x^2+13x+5}$
   n) $\frac{x}{2x+1}-\frac{3}{x+2}=\frac{1}{2}$

2. Solve the equation by factoring.
   a) $x^2-5x-14=0$
   b) $x^2+8=6x$
   c) $2x^2+5x=3$

3. Solve the equation, if possible, by completing the square.
   a) $x^2-4x-1=0$
   b) $x^2+16=10x$
   c) $x^2+3x=1$
   d) $2x^2+12x=5$
   e) $3x^2+6x=1$
   f) $2x^2+7=2x$

4. Solve the equation, if possible, using the quadratic formula.
   a) $x^2-4x-1=0$
   b) $x^2+16=10x$
   c) $x^2+3x=1$
   d) $2x^2+12x=5$
   e) $3x^2+6x=1$
   f) $2x^2+7=2x$

5. Find all real solutions of the equation.
   a) $x^2-3x-4=0$
   b) $x^2+18=9x$
   c) $x^2=3x+1$
   d) $2x^2+7x=4$
   e) $9x^2-3x-2=0$
   f) $x^2=8x$
   g) $3t^2-5t+2=0$
   h) $x^2-2\sqrt{2}x-6=0$
   i) $x=4+\frac{14}{x}$
   j) $\frac{x}{x-1}-\frac{5}{x}=-\frac{1}{x^2-x}$

k) $1+\frac{4}{x-6}=\frac{1}{x+4}$

l) $\frac{x-2}{x-3}+\frac{1}{x+2}=\frac{5}{x^2-x-6}$

m) $x^5-x^4-6x^3=0$

n) $x^3+2x^2-25x-50=0$

o) $x^4-16=0$

p) $(x-1)^4+3(x-1)^3=0$

q) $(x+1)^5(x-3)^7-2(x+1)^4(x-3)^8$

r) $(x-2)^2+7(x-2)+10=0$

s) $x^4-4x^3-x+4=0$

t) $\sqrt{x+5}=\sqrt{3x-1}$

u) $x-\sqrt{4x+5}=0$

v) $x=\sqrt{4x-11}+2$

w) $x+3=2\sqrt{x-6}+9$

x) $27x^{\frac{3}{2}}=125$

y) $x^7=128$

z) $x^{\frac{7}{3}}+6x^{\frac{4}{3}}+9x^{\frac{1}{3}}=0$

aa) $x^{\frac{5}{2}}+8x^{\frac{-1}{2}}=0$

bb) $x^{\frac{7}{4}}=3x^{\frac{3}{4}}+28x^{\frac{-1}{4}}$

cc) $(x-4)^{\frac{2}{3}}+8(x-4)^{\frac{-1}{3}}=0$

dd) $x(x+5)^{\frac{1}{2}}-3(x+1)(x+5)^{\frac{-1}{2}}=0$

ee) $|3x-4|=19$

ff) $|2x+1|=x-5$

gg) $|x^2-9|=25$

hh) $|x^2+2x+1|=4$

6. The product of two consecutive numbers is 42. What are the two numbers?

7. A total of $500 is to be divided between Mary and Jane. If Mary is to have $100 more than Jane, how much money should each receive?

8. Out of the first three tests, Sarah obtained grades of 72, 95 and 81. What grade does she need to get on the fourth test to have an average of 85?

9. A rectangular garden is 5m wide. How long should it be in order to have a total area of 60 $m^2$?

10. A rectangular garden is to be 3 times as long as it is wide. What should be its dimension if it is to have a total area of 75 $m^2$?

11. A coffee manufacturer wants to sell a new blend of coffee at $13.95/kg that is to be made from two coffees, one that is sold at $8.00/kg and the other at $16.50/kg. How much of each coffee is needed for a bag with 500 grams of the new blend of coffee?

12. In going to Toronto (800 km from Quebec), Luke and Lea both drive the car. Luke drives for the first part at 120 km/h and Lea drives the rest, at 110 km/h. If the trip akes 7 hours, for how long does Luke drive?

13. Isaac, by himself, can paint a 3 ½ room apartment in 12 hours. If Rene helps him, then it takes 8 hours. How long would it take Rene to paint a 3 ½ room apartment all by himself?

# ANSWERS

1. a) $\frac{15}{4}$ b) $\frac{-6}{5}$ c) $\frac{-27}{4}$ d) -2
   e) 2 f) $\frac{-8}{3}$ g) $\frac{-24}{11}$ h) $\frac{-1}{2}$
   i) $\frac{3}{5}$ j) $\frac{3}{64}$ k) $\frac{5}{12}$ l) $\frac{9}{7}$
   m) $-3$ n) $\frac{-8}{13}$
2. a) -2, 7 b) 2, 4 c) $-3, \frac{1}{2}$
3. a) $2 \pm \sqrt{5}$ b) 2, 8 c) $\frac{-3}{2} \pm \frac{1}{2}\sqrt{13}$ d) $-3 \pm \frac{1}{2}\sqrt{46}$
   e) $-1 \pm \frac{2}{3}\sqrt{3}$ f) No solution
4. a) $2 \pm \sqrt{5}$ b) 2, 8 c) $\frac{-3}{2} \pm \frac{1}{2}\sqrt{13}$ d) $-3 \pm \frac{1}{2}\sqrt{46}$
   e) $-1 \pm \frac{2}{3}\sqrt{3}$ f) No solution
5. a) -1, 4 b) 3, 6 c) $\frac{3}{2} \pm \frac{1}{2}\sqrt{13}$ d) $-4, \frac{1}{2}$
   e) $\frac{-1}{3}, \frac{2}{3}$ f) 0, 8 g) $\frac{2}{3}$, 1 h) $-\sqrt{2}, 3\sqrt{2}$
   i) $2 \pm 3\sqrt{2}$ j) 2, 3 k) -2, 1 l) -4
   m) -2, 0, 3 n) -5, -2, 5 o) -2, 2 p) -2, 1
   q) -1, 3, 7 r) -3, 0 s) 1, 4 t) 3
   u) 5 v) 3, 5 w) 6, 10 x) $\frac{25}{9}$
   y) 2 z) 0, -3 aa) No solution bb) 7
   cc) -4 dd) -3, 1 ee) $-5, \frac{23}{3}$ ff) No solution
   gg) $\pm\sqrt{34}$ hh) -3, 1
6. 6 and 7
7. Mary \$300 and Jane \$200
8. 92
9. 12m
10. 5m by 15m
11. 150 grams of the coffee at \$8.00/kg and 350 grams of the coffee at \$16.50/kg
12. 3 hours
13. 24 hours