

1. Calculate using the law of exponents(指數律).

(a) $(16)^{-\frac{3}{4}}$

(b) $\frac{7^{3/2}}{49}\sqrt{7}$

(c) $(3^{1/3} 3^{1/2})^2 \sqrt[3]{3}$

(d) $\frac{\sqrt{5}}{\sqrt{15}\sqrt{3}}$

(e) $2^{1/3} 2^{1/2} 2^{1/6}$

2. Simplify(化簡) the following. Write your answer without parentheses(括號) and negative exponents(負指數).

(a) $\frac{x^2}{x^{-4}}$

(b) $\frac{x^2(x^{-4} + 1)}{x^{-2}}$

(c) $(\frac{x}{x^2y^2})^3y^8$

(d) $(\frac{1}{xy})^{-2}(\frac{x}{y})^2$

(e) $(\frac{3x^{3/2}y^3}{x^2y^{-1/2}})^{-2}$

3. Rationalize the numerator(有理化分母) and simplify.

(a) $\frac{\sqrt{10}}{\sqrt{5} - 2}$

(b) $\frac{\sqrt{2} + 1}{\sqrt{2} - 1}$

4. Rationalize the denominator(有理化分子) and simplify.

(a) $\frac{\sqrt{4+h} - 2}{h}$

5. Given $f(x) = \frac{x}{x+1}$ and $g(x) = x+1$, Express the following as a rational function(有理函數, 分式函數).

(a) $f(x) + g(x)$

(b) $f(x) \cdot g(x)$

(c) $f(x) - xg(x)$

(d) $\frac{g(x)}{f(x)}$

(e) $f(x) - \frac{g(x)}{x+1}$

6. Given $f(t) = t^2$ and $g(t) = \frac{t}{t+1}$, calculate the following functions. Simplify your answers as much as possible.

(a) $f(g(t))$

(b) $g(f(t))$

(c) $f(f(g(t)))$

(d) $f(g(t+1))$

(e) $g(f(t-1))$

(f) $f(t-1)$

7. Find $\frac{f(x+h) - f(x)}{h}$ for each of the function and simplify as much as possible.

(a) $f(x) = x^2 + 2x$

(b) $f(x) = \frac{1}{x}$

(c) $f(x) = x^3 - 1$

8. Graph(畫圖) the function. Determine clearly the intercepts(截距) of the graph.

(a) $f(x) = 2x - 1$

(b) $f(x) = -x$

(c) $f(x) = -x + 2$

(d) $f(x) = -\frac{x-1}{2}$

(e) $f(x) = 3$

9. Find the points of intersection(交點)(if any) of the pair of curves.

(a) $y = 3x + 1$, $y = -x - 2$

(b) $y = \frac{x}{2}$, $y = 3$

(c) $y = 4x - 7$, $y = 0$

(d) $y = 2x + 3$, $y = 2x - 2$

10. Factor(因式分解) each expression.

- (a) $4x^2 - 25$
- (b) $x^3y - 4xy$
- (c) $2x^2 + 5x - 12$
- (d) $x^3 + x^2 - 2x$
- (e) $x^3 - 3x^2 - 4x + 12$

11. Solve each equation by factoring(因式分解) first.

- (a) $x^2 - 144 = 0$
- (b) $x^2 + 4x + 4 = 0$
- (c) $x^2 - x - 12 = 0$
- (d) $x^3 + 8x^2 + 15x = 0$
- (e) $6x^3 + 11x^2 + 3x = 0$

12. Solve each equation by the quadratic formula(二次公式).

- (a) $2x^2 + 3x - 1 = 0$
- (b) $x^2 + x - 1 = 0$
- (c) $x^2 - x - 12 = 0$
- (d) $-3x^2 + 2x - 4 = 0$
- (e) $x^2 + 4x - 4 = 0$

13. Solve each inequality(不等式). Write your answer using interval notation(區間表示法).

- (a) $-4 < 5 - 3x \leq 17$
- (b) $x^2 < 2x + 8$
- (c) $x(x - 1)(x + 2) > 0$
- (d) $x > x^2$

14. Solve each equation.

- (a) $x^2 - 3x = 4x - 10$
- (b) $4x^2 + 2x = -2x + 3$
- (c) $\frac{1}{x+1} = x + 1$
- (d) $x + 5 = 14 - \frac{x}{2}$
- (e) $\frac{2x}{x+1} = \frac{2x-1}{x}$

15. Find an equation for the line that passes through(通過) the point (2,-5) and

- (a) has slope(斜率) -3 .
(b) is parallel(平行) to the x-axis(x 軸) .
(c) is parallel to the y-axis(y 軸).
(d) is parallel to the line $2x - 4y = 3$.
16. Find an equation for the circle(圓) that has center $(-1,4)$ and passes through(通過)
- (a) the point $(3,-2)$.
(b) the point $(2,8)$.
17. Sketch the region in the xy -plane(在 xy 平面畫出區域) defined by the equation or inequalities.
- (a) $y = 1 - \frac{x}{2}$
(b) $y = x^2 - 1$
(c) $x^2 + y^2 = 4$
(d) $-1 \leq y \leq 3$
(e) $y < 1 - \frac{x}{2}$
18. Calculate using the law of logarithm(對數律).
- (a) $\log_5 1$
(b) $\log_8 2$
(c) $\log_6 \frac{1}{36}$
(d) $\log_2 2^{10}$
(e) $\log_2 8 - \log_2 4$
(f) $\log_3 \frac{27}{\sqrt{3}}$
19. Solve each absolute value(絕對值) equations or inequalities.
- (a) $3|5 - 2x| = 1$
(b) $|2x - 5| = -3$
(c) $|2x - 5| = |8x + 3|$
(d) $|x - 3| \leq 10$
(e) $|5x - 3| > -1$
20. Solve the given exponential(指數) equations.
- (a) $2^{x-4} = 8$
(b) $(2^{x+1} \cdot 2^{-3})^2 = 2$

(c) $4^x - 5 \cdot 2^x + 4 = 0$

(d) $9^x - 3^{x+1} - 4 = 0$

21. Solve the given logarithmic(對數) equations.

(a) $2 \log_3 x = 1$

(b) $\log_3(4 - 2x) = 3$

(c) $(\log_2 x)^2 - 5 \cdot \log_2 x + 4 = 0$

(d) $3 \log_2 x - \log_2 3x = 0$

22. Solve the given equations.

(a) $\sqrt{x} - \frac{1}{\sqrt{x}} = 0$

(b) $\sqrt{x} - 2\sqrt{x^3} = 0$

(c) $\frac{-x}{\sqrt{4-x^2}} = 0$