

1. Evaluate the following exponents:

(a) 3^4

(b) $(2^5) \cdot (2^3)$

(c) $\frac{10^2}{2}$

(d) $\frac{4^2}{4^3}$

(e) 5^{4-3}

(f) 3^{-2}

2. Evaluate the following logarithms:

(a) $\log_{10} 1000$

(b) $\lg 256$

(c) $\ln e^2$

(d) $e^{\ln 3}$

(e) $\log_7 49$

(f) $\frac{\lg 256}{\lg 64}$

(g) $\log_{10} (4) + \log_{10} (25)$

(h) $(a^{\log_a 4})^2$

3. Show that: $\log_b (x^n) = n \cdot (\log_b x)$

4. Simplify (if necessary) and write the following fractional exponents as radicals then evaluate them:

(a) $16^{\frac{1}{2}}$

(b) $729^{\frac{1}{3}}$

(c) $27^{\frac{2}{3}}$

(d) $3125^{\frac{3}{5}}$

(e) $125^{\frac{2}{3}}$

(f) $5^{\frac{2}{3}} \cdot 25^{\frac{1}{3}}$

(g) $\frac{27^{\frac{2}{3}}}{27^{\frac{1}{3}}}$

(h) $\log_{10} \left(10^{\frac{1}{2}} \right)$

5. Show that: $\sqrt[n]{x^m} = \sqrt[n]{(x)^m} = (\sqrt[n]{x})^m$

6. Which of the following is *not* a function?

(a) $x^2 + y^2 = 1$

(c) $\{0 \mapsto 1, 1 \mapsto -1, 2 \mapsto 0, 3 \mapsto -1\}$

(b) $y = 2x^3 - 3x^2 + x - 1$

(d) $\{0 \mapsto 1, 1 \mapsto -1, 0 \mapsto 2, 3 \mapsto -1\}$

7. Given $f(x) = x^2 + 6x + 9$ evaluate each of the following.

(a) $f(0)$

(c) $f(f(-2))$

(b) $f(-3)$

(d) $f(3)$

8. Sketch the polynomial from the previous question.

9. Indicate which of the following functions are *polynomials*, and for the polynomials, identify its *degree*.

(a) $f(x) = x^3 - 2x + 1$

(d) $f(w) = (w + 3)^3$

(b) $f(\theta) = \theta^3 - \sin^2 \theta$

(e) $f(x) = 3^x$

(c) $f(x) = x^4 - 2x^3 + 2x^2 - x + 1$

(f) $f(y) = \frac{1-e^y}{1+e^y}$

10. Factor and find the roots of the following polynomials.

(a) $f(y) = (y - 1) \cdot (y + 2) \cdot y$

(d) $f(z) = z^2 + 4z + 2$

(b) $f(x) = x^2 - 4$

(e) $f(x) = x^3 - 2x^2 - x + 2$

(c) $f(w) = w^3 + 3w^2 + 3w + 1$

(f) $f(x) = x^4 + x^3 - 11x^2 - 9x + 18$

11. Convert each of the following angles to radians. Express your answers as fractions of π

- (a) 60° (c) 90° (e) 180°
(b) 45° (d) 360° (f) 30°

12. Convert each of the following angles to radians. Round to the nearest hundredths.

- (a) 18° (c) 276°
(b) 92° (d) 135°

13. Convert each of the following angles to degrees. Round to the nearest tenths.

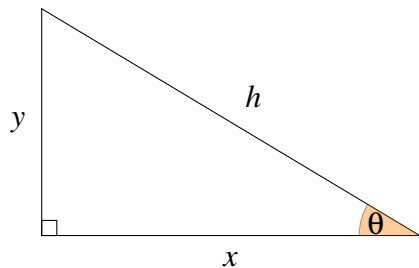
- (a) $\frac{\pi}{4}$ (c) 6.013
(b) $\frac{2\pi}{7}$ (d) 4.32

14. Use a calculator to evaluate the following expressions, correct to three decimal places.

- (a) $\cos(\pi/3)$ (c) $\sec(0.3)$ (e) $\cos^2\left(\frac{2\pi}{7}\right)$
(b) $\sin(2.013)$ (d) $\tan(1.82)$ (f) $\cot^2(27^\circ)$

15. Show that $\sin^2(\theta) + \cos^2(\theta) = 1$.

16. Consider the following right triangle. Then answer the questions to the right.



- (a) Let $x := 2$, $h = 4$. What is θ ?
(b) Let $\theta := \frac{\pi}{3}$, $h = 4$. What is y ?
(c) Let $\theta := \frac{2\pi}{5}$, $x = 4$. What is h ?
(d) Let $x := 3$, $y = 5$. What is θ ?

17. Convert each of the following 2D polar coordinates into 2D planar Euclidean coordinates. Round to the nearest hundredths.

- (a) $\rho = 2$, $\theta = \frac{\pi}{4}$ (d) $\rho = 3.1$, $\theta = 5.317$
(b) $\rho = 1$, $\theta = 270^\circ$ (e) $\rho = 9\frac{2}{3}$, $\theta = 47^\circ$
(c) $\rho = \frac{1}{3}$, $\theta = \frac{5\pi}{3}$ (f) $\rho = 10.42$, $\theta = \frac{7\pi}{6}$