

ARE YOU READY FOR CALCULUS

- 1.) Simplify: a.) $\frac{x^3-9x}{x^2-7x+12}$ b.) $\frac{x^2-2x-8}{x^3+x^2-2x}$ c.) $\frac{\frac{1}{x}-\frac{1}{5}}{\frac{1}{x^2}-\frac{1}{25}}$ d.) $\frac{9-x^{-2}}{3+x^{-1}}$
- 2.) Rationalize the denominator:
a.) $\frac{2}{\sqrt{3}+\sqrt{2}}$ b.) $\frac{4}{1-\sqrt{5}}$ c.) $\frac{1}{1+\sqrt{3}-\sqrt{5}}$
- 3.) Write each of the following expressions in the form $ca^p b^q$ where c, p, and q are real numbers:
a.) $\frac{(2a^2)^3}{b}$ b.) $\sqrt{9ab^3}$ c.) $\frac{a(\frac{2}{b})}{\frac{3}{a}}$ d.) $\frac{ab-a}{b^2-b}$ e.) $\frac{a^{-1}}{(b^{-1})\sqrt{a}}$ f.) $\left(\frac{a^{2/3}}{b^{1/2}}\right)^2 \left(\frac{b^{3/2}}{a^{1/2}}\right)$
- 4.) Solve for x (to be done without a calculator):
a.) $5^{(x+1)} = 25$ b.) $\frac{1}{3} = 3^{2x+2}$ c.) $\log_2 x = 3$ d.) $\log_3 x^2 = 2 \log_3 4 - 4 \log_3 5$
- 5.) Simplify:
a.) $\log_2 5 + \log_2(x^2 - 1) - \log_2(x - 1)$ b.) $2 \log_4 9 - \log_2 3$ c.) $3^{2 \log_3 5}$
- 6.) Simplify:
a.) $\log(10^{1/2})$ b.) $\log\left(\frac{1}{10^x}\right)$ c.) $2 \log \sqrt{x} - 3 \log x^{1/3}$
- 7.) Solve the following equations for the indicated variables:
a.) $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$, for a b.) $V = 2(ab + bc + ca)$, for a
c.) $A = 2\pi r^2 + 2\pi rh$, for positive r d.) $A = P + nrP$, for P
e.) $2x - 2yd = y + xd$, for d f.) $\frac{2x}{4\pi} + \frac{1-x}{2} = 0$, for x
- 8.) For the equations, complete the square and reduce to one of the standard forms:
 $y - b = A(x - a)^2$ or $x - a = A(y - b)^2$
a.) $y = x^2 + 4x + 3$ b.) $3x^2 + 3x + 2y = 0$ c.) $9y^2 - 6y - 9 - x = 0$
- 9.) Factor completely:
a.) $x^6 - 16x^4$ b.) $4x^3 - 8x^2 - 25x + 50$ c.) $8x^3 + 27$ d.) $x^4 - 1$
- 10.) Find all real solutions to:
a.) $x^6 - 16x^4 = 0$ b.) $4x^3 - 8x^2 - 25x + 50 = 0$ c.) $8x^3 + 27 = 0$
- 11.) Solve for x :
a.) $3 \sin^2 x = \cos^2 x$ $[0, 2\pi]$ b.) $\cos^2 x - \sin^2 x = \sin x$ $(-\pi, \pi]$
c.) $\tan x + \sec x = 2 \cos x$ $(-\infty, \infty)$

12.) Without a calculator, evaluate the following:

a.) $\cos 210^\circ$ b.) $\sin \frac{5\pi}{4}$ c.) $\tan^{-1}(-1)$ d.) $\sin^{-1}(-1)$
e.) $\cos \frac{9\pi}{4}$ f.) $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$ g.) $\tan \frac{7\pi}{6}$ h.) $\cos^{-1}\left(\frac{1}{2}\right)$

13.) Solve the equations:

a.) $4x^2 + 12x + 3 = 0$ b.) $2x + 1 = \frac{5}{x+2}$ c.) $\frac{x+1}{x} - \frac{x}{x+1} = 0$

14.) Find the remainders on division of:

a.) $x^5 - 4x^4 + x^3 - 7x + 1$ by $x + 2$
b.) $x^5 - x^4 + x^3 + 2x^2 - x + 4$ by $x^3 + 1$

15.) The equation $12x^3 - 23x^2 - 3x + 2 = 0$ has a solution $x = 2$. Find all other solutions.

16.) Solve for x , the equation $12x^3 + 8x^2 - x - 1 = 0$ (All solutions are rational & between ± 1 .)

17.) Solve the inequalities:

a.) $x^2 + 2x - 3 \leq 0$ b.) $\frac{2x-1}{3x-2} \leq 1$ c.) $x^2 + x + 1 > 0$

18.) Solve for x :

a.) $|-x + 4| \leq 1$ b.) $|5x - 2| = 8$ c.) $|2x + 1| = x + 3$

19.) Determine the equations of the following lines:

- a.) the line through $(-1,3)$ and $(2,4)$
b.) the line through $(-1,2)$ and perpendicular to the line $2x - 3y + 5 = 0$
c.) the line through $(2,3)$ and the midpoint of the line segment from $(-1,4)$ to $(3,2)$.

20.) Find the point of intersection of the lines: $3x - y - 7 = 0$ and $x + 5y + 3 = 0$

21.) Graph and shade the region in the x - y plane that is described by the inequalities. (Should be done without the aid of a calculator.)

$$\begin{cases} 3x - y - 7 < 0 \\ x + 5y + 3 \geq 0 \end{cases}$$

22.) Find the domain of the function $f(x) = \frac{(3x+1)}{\sqrt{x^2+x-2}}$

23.) Find the domain and range of the functions:

a.) $f(x) = 7$ b.) $g(x) = \frac{5x-3}{2x+1}$

24.) Simplify $\frac{f(x+h)-f(x)}{h}$, where a.) $f(x) = 2x + 3$ b.) $f(x) = \frac{1}{x+1}$ c.) $f(x) = x^2$

25.) Sketch the graphs of the functions WITHOUT the aid of a graphing device:

a.) $g(x) = |3x + 2|$ b.) $h(x) = |x(x - 1)|$

26.) Find the inverse of the functions:

a.) $f(x) = 2x + 3$ b.) $f(x) = \frac{x+2}{5x-1}$