1) Simplify.

a) $\dfrac{x-4}{x^2-3x-4}$

b) $\dfrac{x^2-4x-32}{x^2-16}$

c) $\dfrac{5-x}{x^2-25}$

2) Simplify each expression. Write answers with positive exponents where applicable:

a) $\dfrac{1}{x+h}-\dfrac{1}{x}$

b) $\dfrac{\frac{2}{x^2}}{\frac{10}{x^5}}$

c) $\dfrac{12x^{-3}y^2}{18xy^{-1}}$

d) $\dfrac{15x^2}{5\sqrt{x}}$

e) $\left(5a^3\right)\left(4a^2\right)$

f) $\left(4a^{\frac{5}{3}}\right)^{\frac{3}{2}}$

g) $\dfrac{\frac{1}{2}-\frac{5}{4}}{\frac{3}{8}}$

3) Simplify the following exponents and logarithms.

a) $\log_2 8$

d) $27^{\frac{2}{3}}$

b) $\log \frac{1}{100}$

e) $\ln 1$

c) $\ln e^7$

f) e^0

4) Solve for z:

a) $4x + 10yz - 3 = 0$

b) $y^2 + 3yz - 8z - 4x = 0$

5) Given $f(x) = \frac{x}{x+3}$, $g(x) = \sqrt{x-3}$, $h(x) = x^2 + 5$, find:

a) $h(g(x))$

b) $(f \circ h)(-2)$

c) $f(f(3))$

d) $h^{-1}(x)$ (inverse!)

6) Using either the slope-intercept or point-slope form of a line to write the equation for the lines described:
   a) with slope -2 and containing the point (3,4)

   b) containing the points (1,-3) and (-5,2)

   c) with slope 0 and containing the point (4,2)

   d) parallel to line $2x-3y=7$ and containing the point (5,1)

   e) perpendicular to the line $-3y+6x=2$ and containing the point (4,3)

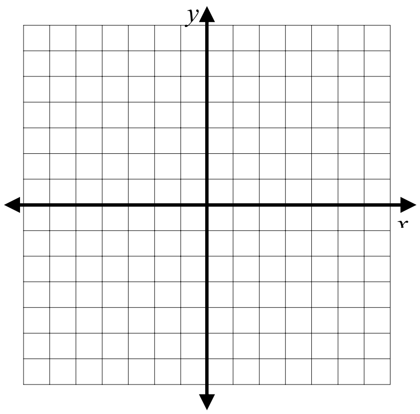
7) Let f be a linear function where $f(2)=-5$ and $f(-3)=1$. State the function $f(x)$.

8) Find the distance between the points (8,-1) and (-4,-6).

9) Without a calculator, determine the exact value of each expression:
   a) $\sin\frac{\pi}{2}$
   b) $\sin\frac{3\pi}{4}$
   c) $\cos\pi$
   d) $\cos\frac{7\pi}{6}$
   e) $\cos\frac{\pi}{3}$
   f) $\tan\frac{7\pi}{4}$
   g) $\tan\frac{2\pi}{3}$
   h) $\tan\frac{\pi}{2}$

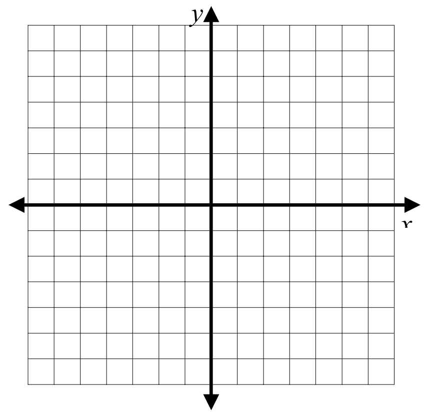
10) For each function, make a neat sketch, including a scale or numbering of the axes. Name the domain and range for each as well. (Remember – no calculator!)

a) $y = \sqrt{x}$



D:
R:

b) $y = \sqrt[3]{x}$



D:
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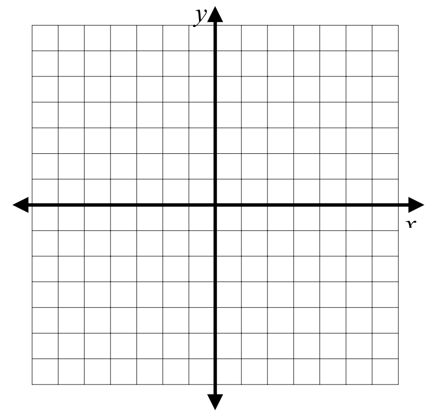
c) $y = e^x$



D:
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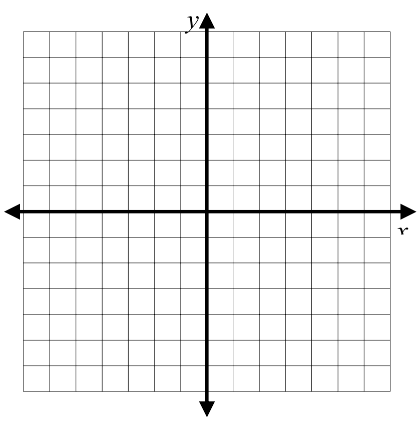
d) $y = \ln x$



D:
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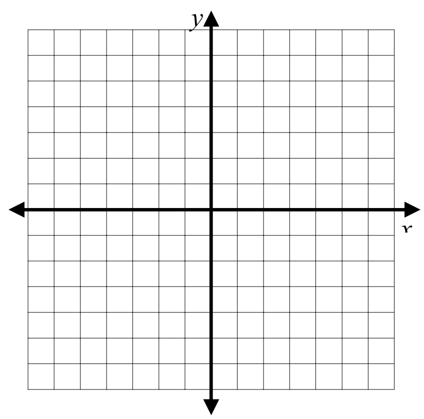
e) $y = 2^x$



D:
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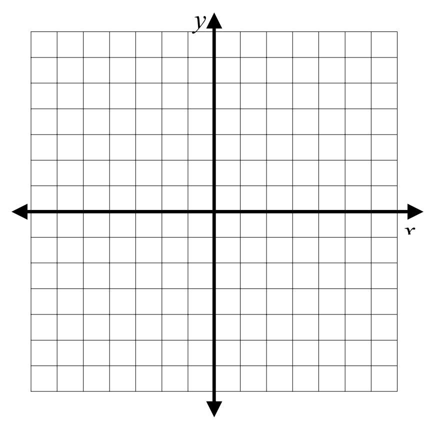
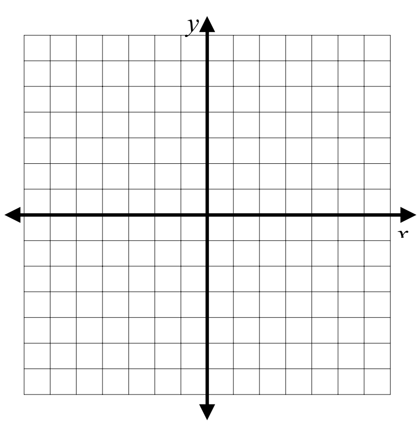
f) $y = 1/x$

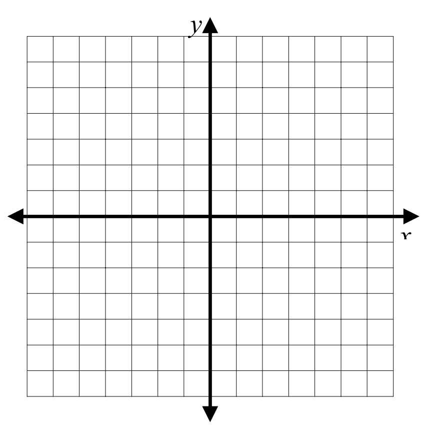


D:
R:

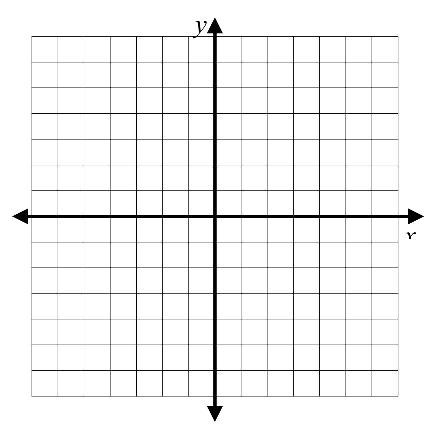
g) $y = x^2 - 4$



h) $y = x^2 + 4x + 3$



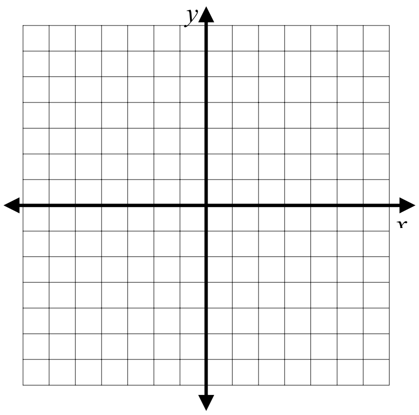
i) $y = \sin x$



j) $y=\sqrt{x-2}$

k) $y=\sqrt{4-x^2}$

l) $y=|x+3|-2$



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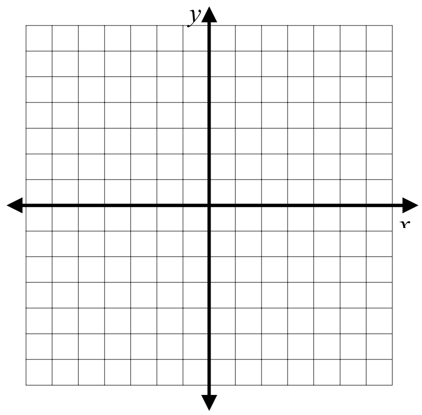

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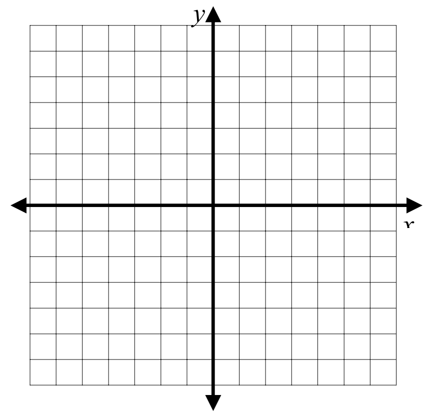
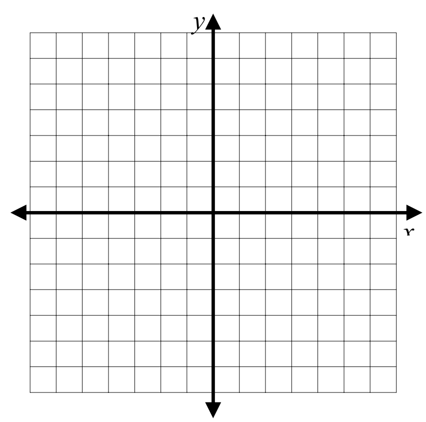


D:
R:

11) Identify the vertical and horizontal asymptotes in the graph of $y=\dfrac{3x^2+5}{x^2-4}$.

12) Sketch a graph of the piecewise function:

$$f(x)=\begin{cases} x^2-5, x<-1 \\ 0, x=-1 \\ 3-2x, x>-1 \end{cases}$$



13) Determine all points of intersection (using algebra):

a) parabola $y=x^2+3x-4$ and the line $y=5x+11$

b) $y=\cos x$ and $y=\sin x$ in the first quadrant

14) Solve for x, where x is a real number (remember – no calculator!).

a) $x^2 + 3x - 4 = 14$

b) $2x^2 + 5x = 3$

c) $(x-5)^2 = 9$

d) $(x+3)(x-3) > 0$

e) $\log x + \log(x-3) = 1$

f) $|x-3| < 7$

g) $3\sqrt{x-2} - 8 = 8$

h) $12x^2 = 3x$

i) $27^{2x} = 9^{x-3}$

j) $4e^{2x} = 12$

15) Eliminate the parameter and write the rectangular equation for: $\begin{cases} x = t^2 + 3 \\ y = 2t \end{cases}$

16) Expand and simplify:

a) $\sum_{n=2}^{5} 3n-6$

b) $\sum_{n=0}^{4} \frac{(n+1)^2}{n!}$

17) Given the vectors $\vec{v} = -2i + 5j$ and $\vec{w} = 3i + 4j$, determine:

a) $\frac{1}{2}\vec{v}$

b) $\vec{w} - \vec{v}$

c) $\left|\vec{w}\right|$

d) magnitude of $\vec{v}$

e) $\vec{w} \bullet \vec{v}$

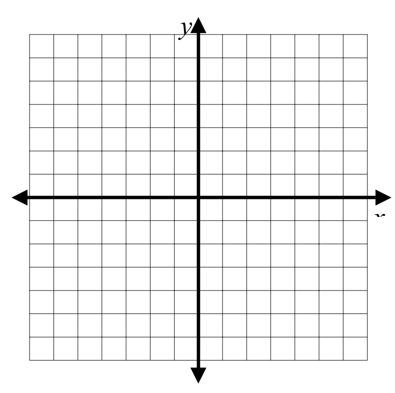
18) Rectangular-Polar conversions:

a) Convert $(1,4)$ to polar coordinates.

b) Convert $\left(2, \pi/6\right)$ to rectangular coordinates.

19) Graph the following parametric equations for $0 \le t \le 3$:

$$\begin{cases} x = 2t - 1 \\ y = 3t - 5 \end{cases}$$



20) Complete the following identities:

a) $\sin^2 x + \cos^2 x =$

b) $1 + \tan^2 x =$

c) $\cot^2 x + 1 =$

d) $\sin 2x =$

e) $\cos 2x =$