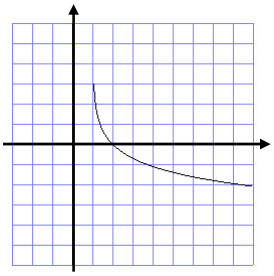
Calculus
Chapter 1 In Class Review

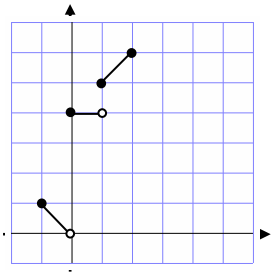
For questions 1 and 2, sketch each without a calculator.

1. $y=-\log(x-1)$

Reflect across the *x* axis … Right 1
Asymptote at *x* = 1.



2. $y=\begin{cases}-x & -1\le x<0\\ 4 & 0\le x<1\\ x+5 & 1\le x\le 2\end{cases}$



3. Prove whether the function is odd or even: $y=x^3-5x$

To prove, plug in "–*x*" to the function … $f(-x)=(-x)^3-5(-x)=-x^3+5x=-(x^3-5x)=-f(x)$

$\therefore f(x)$ is ODD

4. Change to base 10. $\log_7 14$

Use the change of base formula … $\dfrac{\log 14}{\log 7}$

5. Find *k* in the equation $3y + kx = 4$

a) to make the line horizontal

horizontal line has a slope of zero … *y* values are always the same … equation of the form *y* = # … thus, *k* = 0.

b) to make the line parallel to $y = 3x + 5$

parallel lines have the same slope … slope of this line is 3 … slope of original line would be $-\dfrac{k}{3}$ … setting these equal to each other and solving gives you *k* = –9.

6. Find the equation of the line perpendicular to $y = -3x + 5$ that goes through (4, 1).

Perpendicular lines have slopes that are opposites and reciprocals … that would mean your new line would have slope = $\frac{1}{3}$.

Using point – slope form … $y-1=\frac{1}{3}(x-4)$.

7. Change to a Cartesian equation: $\begin{aligned}x(t)&=2\sec(t)\\ y(t)&=\tan(t)-1\end{aligned}$

Use the trig identity … $1+\tan^2 x=\sec^2 x$. Solve the equations above for tan *x* and sec *x* and substitute this into the identity to get

$$1+(y+1)^2=\left(\frac{x}{2}\right)^2$$

This becomes the standard equation for a hyperbola if you rewrite it like

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

8. Solve for x given the domain restrictions.

a) $\sin^{-1}\left(\frac{1}{2}\right)=x$ b) $\sin x=\frac{1}{2}$ if $0\le x\le 2\pi$ c) $\sin x=\frac{1}{2}$ if $-\infty<x<\infty$

a) $x=\dfrac{\pi}{6}$

b) $x=\dfrac{\pi}{6}$ and $\dfrac{5\pi}{6}$

c) $x=\dfrac{\pi}{6}+k\cdot 2\pi$ and $x=\dfrac{5\pi}{6}+k\cdot 2\pi$ where k is an integer.

9. $k(x)$ is shown.

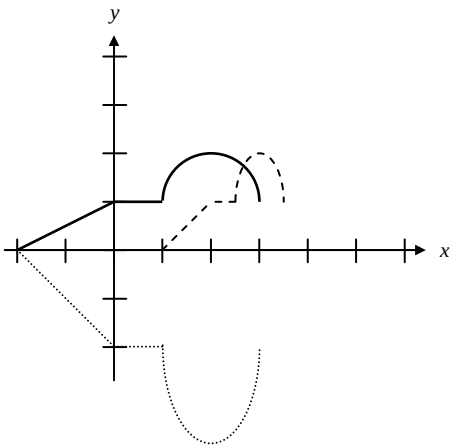
a) Graph $y=-2k(x)$ (dotted)

Reflect over x-axis … vertical stretch (2)

b) Graph $y=k(2x-4)$ (dashed)

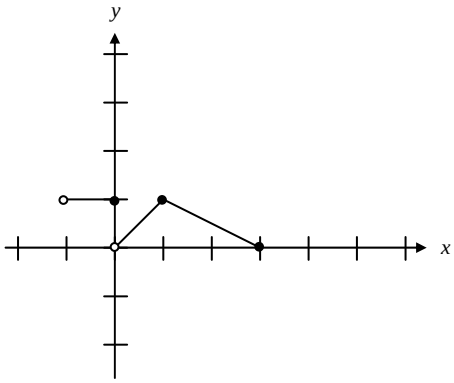
Rewrite $y=k\left(2(x-2)\right)$

Horizontal shrink (1/2) … right 2



10. $h(x)$ is shown. Write the equation for $h(x)$.

$$h(x)=\begin{cases}1 & -1<x\le 0\\ x & 0<x\le 1\\ -\frac{1}{2}x+\frac{3}{2} & 1<x\le 3\end{cases}$$



11. If $\ln(x)-\ln\left(\frac{1}{x}\right)=2$, solve for x.

$$\ln x-\ln\left(\frac{1}{x}\right)=2$$
$$\ln\left(\frac{x}{1/x}\right)=2$$
$$\ln\left(x^2\right)=2$$
$$e^2=x^2$$
$$e=x$$

12. If $f(x)=\frac{4}{x-1}$ and $g(x)=2x$, then the solution set of $f(g(x))=g(f(x))$ is

First, $f(g(x))=f(2x)=\frac{4}{2x-1}$, and then $g(f(x))=g\left(\frac{4}{x-1}\right)=2\left(\frac{4}{x-1}\right)=\frac{8}{x-1}$

Setting them equal to each other and solving gives you

$$f(g(x))=g(f(x))$$
$$\frac{4}{2x-1}=\frac{8}{x-1}$$
$$4x-4=16x-8$$
$$4=12x$$
$$\frac{1}{3}=x$$

A) $\frac{1}{3}$ B) 2 C) 3 D) -1 and 2 E) $\frac{1}{3}$ and 2

13. $\ln(x-2)<0$ if and only if

The ln function is only negative between 0 and 1 … for this function there is a translation of 2 to the right. So, this function is only negative between 2 and 3.

A) $x<3$ B) $0<x<3$ C) $2<x<3$ D) $x>2$ E) $x>3$

14. Which of the following define a function *f* for which $f(-x)=-f(x)$?

This is the definition of an odd function … instead of trying all 5 of these, just pick the one that is odd.

A) $f(x)=x^2$ B) $f(x)=\sin x$ C) $f(x)=\cos x$ D) $f(x)=\log x$ E) $f(x)=e^x$