Prerequisite Skills Review Key

AP Calculus AB
Prerequisite Skill Examples/In-Class Practice

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Date

NO CALCULATOR!

1. What is the domain of $f(x)=\frac{x+1}{x^2-1}$?

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

Domain: $\{x: x\neq 1 \text{ and } x\neq -1\}$

2. If $f(x)=x^3-3x^2-2x+5$ and $g(x)=3$, find $f(g(x))$.

$f(3)=3^3-3(3)^2-2(3)+5$

$=27-27-6+5$

$=-1$

3. If $f(x)=x^3-3x^2-2x+5$ and $h(t)=2t$, find $f(h(t))$.

$f(2t)=(2t)^3-3(2t)^2-2(2t)+5$

$=8t^3-12t^2-4t+5$

4. Evaluate the following expressions:

(a) $f(x)=\sqrt[3]{x^{-2}}$; find $f(8)$

$f(8)=\sqrt[3]{\frac{1}{x^2}}$

$=\sqrt[3]{\frac{1}{8^2}}$

$=\sqrt[3]{\frac{1}{64}}=\frac{1}{4}$

(b) $g(x)=x^{\frac{5}{2}}$; find $g(7)$

$g(7)=7^{\frac{5}{2}}$

$=\sqrt{7^5}$

g(7)

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5. If $\log_b\left(3^b\right)=\frac{b}{2}$, then $b=$

$\log_b(3^b)=\frac{b}{2}$

$\frac{b\log_b 3}{b}=\frac{\frac{b}{2}}{b}$

$\log_b 3=\frac{b}{2b}=\frac{1}{2}$ → $\log_b 3=\frac{1}{2}$

$(b^{\frac{1}{2}})^2=(3)^2$

$b=9$

6. Find $\sin\left(\frac{7\pi}{6}\right)=-\frac{1}{2}$

7. Find $\sec\left(\frac{2\pi}{3}\right)=$

$\frac{1}{\cos(\frac{2\pi}{3})}=\frac{1}{-\frac{1}{2}}=-2$

8. Write the equation of the line that passes through $(6,5)$ and $(4,7)$.

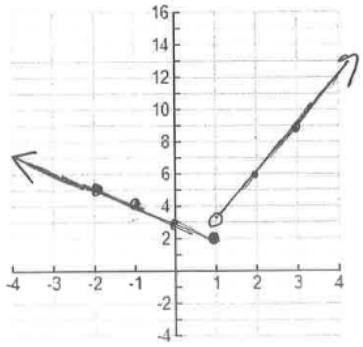
Use point-slope form $y-y_1=m(x-x_1)$. *Point-slope form is MUCH more useful in calculus!*

$m=\frac{7-5}{4-6}=\frac{2}{-2}=-1$

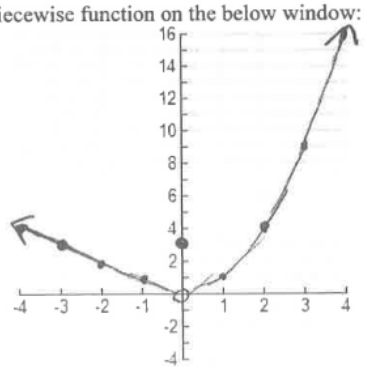
$y-5=-1(x-6)$ or $y-7=-1(x-4)$

9. Graph the following piecewise function on the below window: $f(x)=\begin{cases}3-x, & x\le 1\\ 3x, & 1<x\end{cases}$ "fence"

$-x+3$



10. Graph the following piecewise function on the below window: $g(x)=\begin{cases}|x|, & x<0\\ 3, & x=0\\ x^2, & x>0\end{cases}$ "fence"



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11. Solve $|2x-1|>7$

$2x-1>7$ or $2x-1<-7$

$+1\ +1$ $\quad 2x<-6$

$2x>8$ $\quad x<-3$

$x>4$

$x<-3$ or $x>4$

12a. Explain (in words) how the graph of $g(x)=(x-3)^2+4$ is related to its parent function $f(x)=x^2$

The parabola is translated to the right 3 units and up 4 units.

12b. The parent function $f(x)$ is an even function. Is $g(x)$ an even function? Explain.

No, since $g(x)$ is translated to the right 3, it is no longer symmetric to the y-axis.

13a. Let $f(x)=3x^2+2$, $x\le 0$. Find $f^{-1}(x)$.

$y=3x^2+2$

$x=3y^2+2$

$\frac{x-2}{3}=\frac{3y^2}{3}$

$\pm\sqrt{\frac{x-2}{3}}=\sqrt{y^2}$

$y=-\sqrt{\frac{x-2}{3}}$

13b. Let $g(x)=3e^{2x}$. Find $g^{-1}(x)$.

$y=3e^{2x}$

$\frac{x}{3}=\frac{3e^{2y}}{3}$

$\ln\left(\frac{x}{3}\right)=\ln(e^{2y})$

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

$\frac{1}{2}\ln\left(\frac{x}{3}\right)=y$

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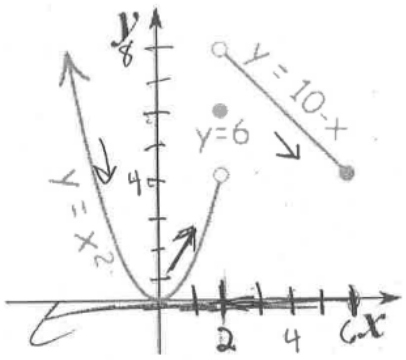
Given the below graph answer the following questions:

a. What is the domain and range of the graph?

b. When is the graph increasing? When is it decreasing?

c. When is the graph concave up? When is it concave down?

14.



14a. Domain: $\{x : x \leq 6\}$

Range: $\{y : y \geq 0\}$

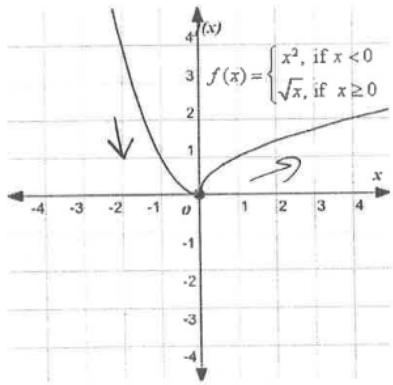
14b. Increasing: $\{x : 0 < x < 2\}$

Decreasing: $\{x : x < 0\}$

$\{x : 2 < x \leq 6\}$

14c. Up: $\{x : x < 2\}$

15.



15a. Domain: $\{x : x \in \mathbb{R}\}$

Range: $\{y : y \geq 0\}$

15b. Increasing: $\{x : x > 0\}$

Decreasing: $\{x : x < 0\}$

15c. Up: $\{x : x < 0\}$

Down: $\{x : x > 0\}$