Lesson 2.1 Increasing, Decreasing, and Piecewise Functions: Applications

A. How do you find the domain?

1) Is it a fraction?
   a. Set the denominator equal to zero and solve for *x*.
   b. Domain: $(-\infty, \_\_\_) \cup (\_\_\_, \infty)$
2) Is it an even index radical?
   a. Set the inside expression ≥ 0 and solve for *x*.
   b. Domain: $[\_\_\_, \infty)$ or it could be $(-\infty, \_\_\_]$
3) All other expressions
   a. Domain is all real numbers or: $(-\infty, \infty)$

Find the domain of the function in interval notation.

1. $f(x) = \dfrac{x+7}{2x-1}$

2. $\dfrac{2x+1}{x-9}$

3. $f(x) = \dfrac{x-4}{x^2+9}$

4. $f(x) = \dfrac{x}{x^2-9}$

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5. $f(x)=\sqrt{t+4}$

6. $f(x)=\sqrt{3-4x}$

7. $f(x)=t^2-3t$

8. $h(z)=\dfrac{\sqrt{z+3}}{z-2}$

9. $P(t)=\dfrac{5}{\sqrt{5t-25}}$

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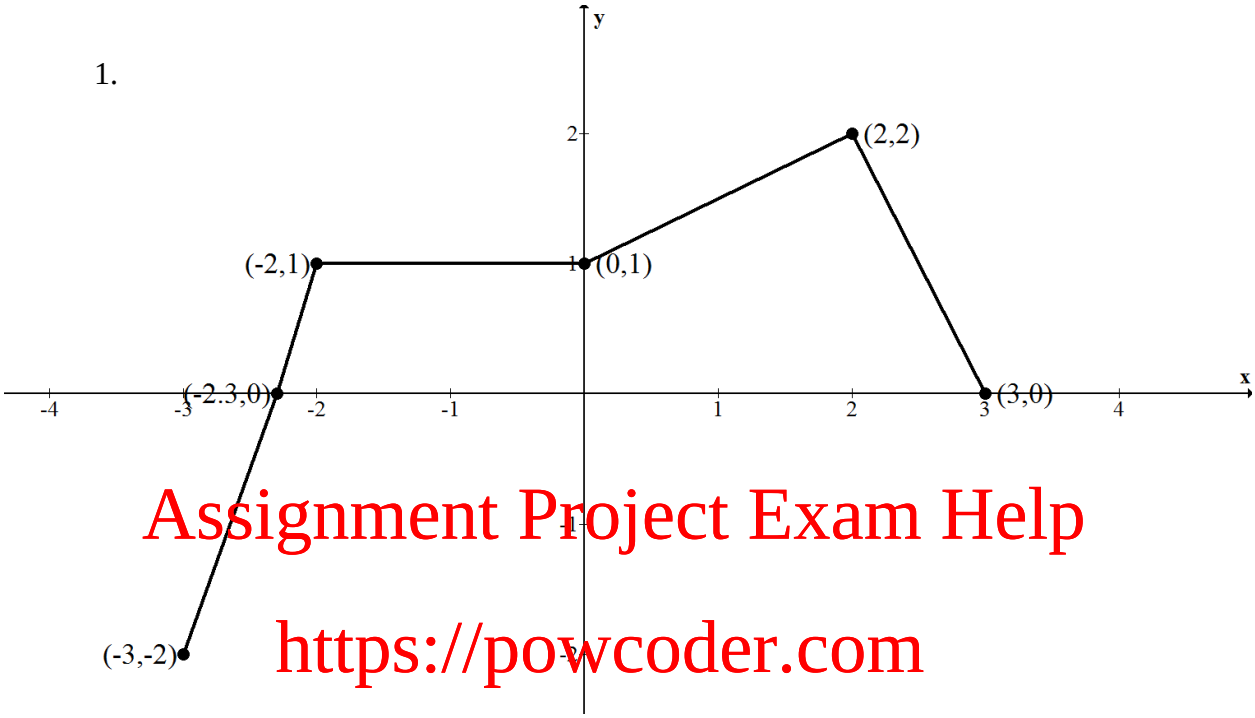
B. Increasing, Decreasing, Constant Intervals

Use the graph to find:

(a) The intercepts, if any
(b) The domain and range
(c) The intervals on which the function is increasing, decreasing or constant

1.



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Piecewise Functions

Evaluate the function at the specified values:

1. $$f(x)=\begin{cases}-3x & \text{if } x<-1\\ 0 & \text{if } x=-1\\ 2x^2+1 & \text{if } x>-1\end{cases}$$

Find $f(-2)$

Find $f(-1)$

Find $f(0)$

2. $$f(x)=\begin{cases}x^3 & \text{if } -2\le x<1\\ 3x+2 & \text{if } 1\le x\le 4\end{cases}$$

Find $f(-1)$

Find $f(0)$

Find $f(1)$

Find $f(3)$

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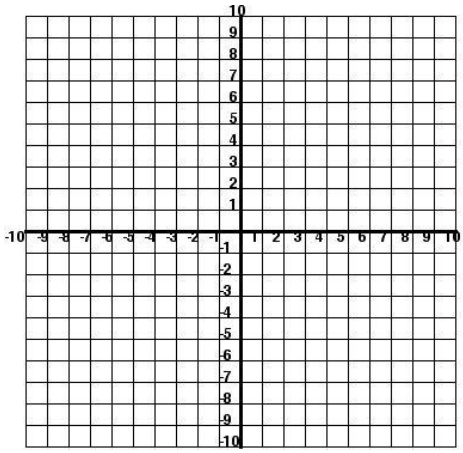
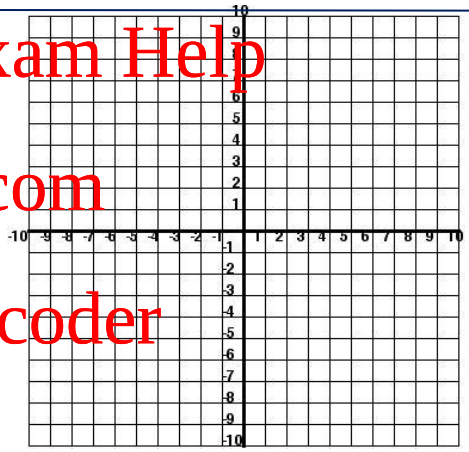
C. Sketch the graph of the piecewise defined function.

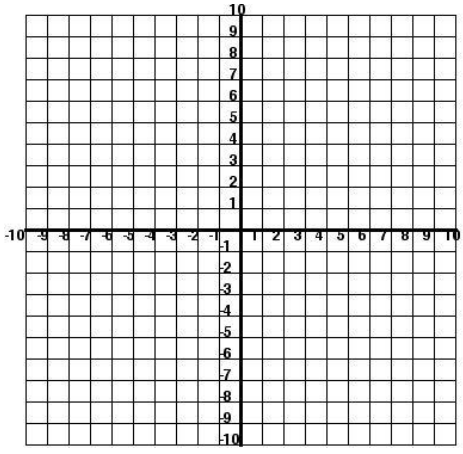
1) $f(x)=\begin{cases}1-x & \text{if } x<-2\\ 5 & \text{if } x\geq 2\end{cases}$



2) $f(x)=\begin{cases}x & \text{if } x\leq 0\\ 2x+3 & \text{if } x>0\end{cases}$



3) $f(x)=\begin{cases}x^2 & \text{if } x\leq 1\\ -3 & \text{if } x>1\end{cases}$



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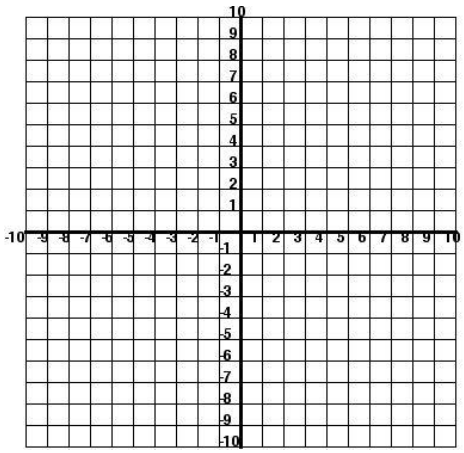
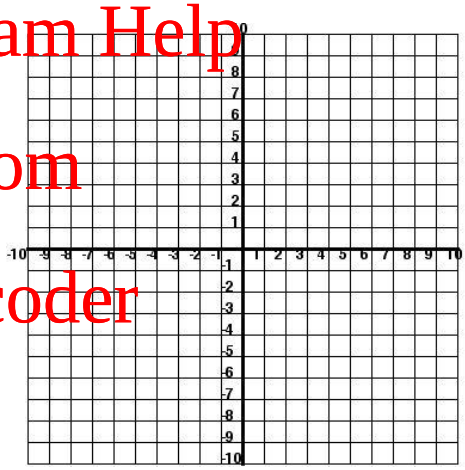
4) $$f(x)=\begin{cases}5 & \text{if } x\le 0\\ x^2-1 & \text{if } 0<x\le 3\\ x-3 & \text{if } x>3\end{cases}$$



5) $$f(x)=\begin{cases}3x & \text{if } x\ne 0\\ 4 & \text{if } x=0\end{cases}$$



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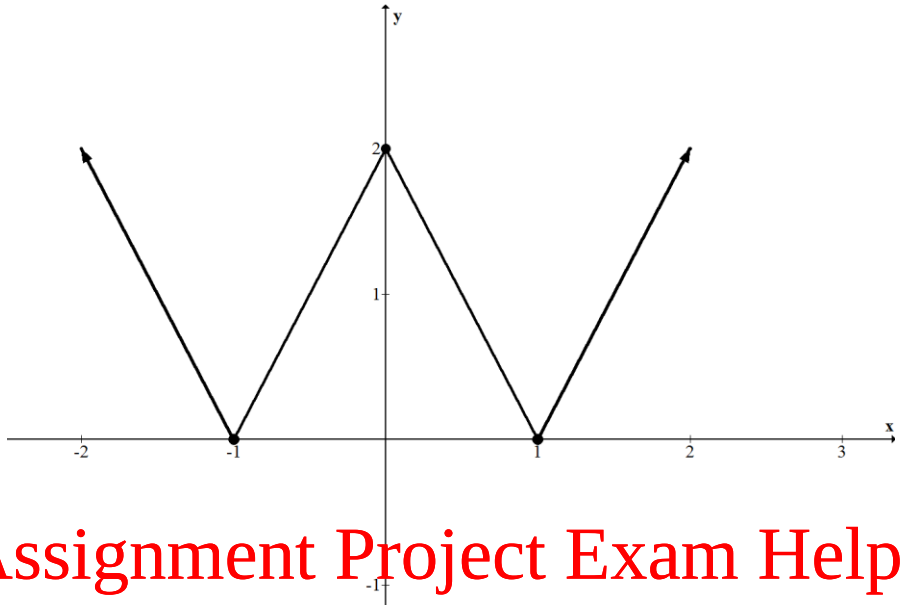
Maxima and Minima

Use the graph to find:

(a) The values, if any, at which *f* has a local maximum. What are these local maxima?

(b) The values, if any at which *f* has a local minimum. What are these local minima?

1.



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