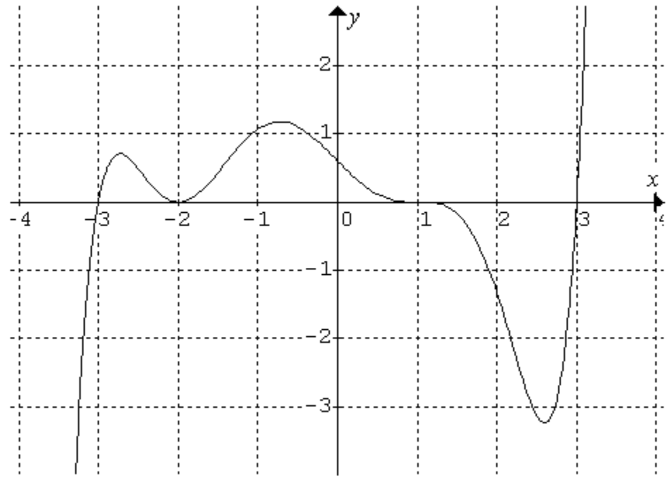
SET THREE: Exercises -- Derivative Concepts

[1] The graph at the right is for the function $y = g(x)$



[a] Circle the *x*-values at which $g(x)$ is positive.

-3.0 -2.5 -2.0 -1.5 -1.0 -0.5 0
0.5 1.0 1.5 2.0 2.5 3.0

[b] Circle the *x*-values at which $g'(x)$ is positive.

-3.0 -2.5 -2.0 -1.5 -1.0 -0.5 0
0.5 1.0 1.5 2.0 2.5 3.0

[c] Approximate to 1 decimal place all the *x*-values at which $g'(x)$ is zero.

[d] Approximate to 1 decimal place all the *x*-values at which $g''(x)$ is zero.

[e] Circle the *x*-values at which $g''(x)$ is positive. -3.0 -2.1 -1.0 0 0.5 1.0 2.5 3.0

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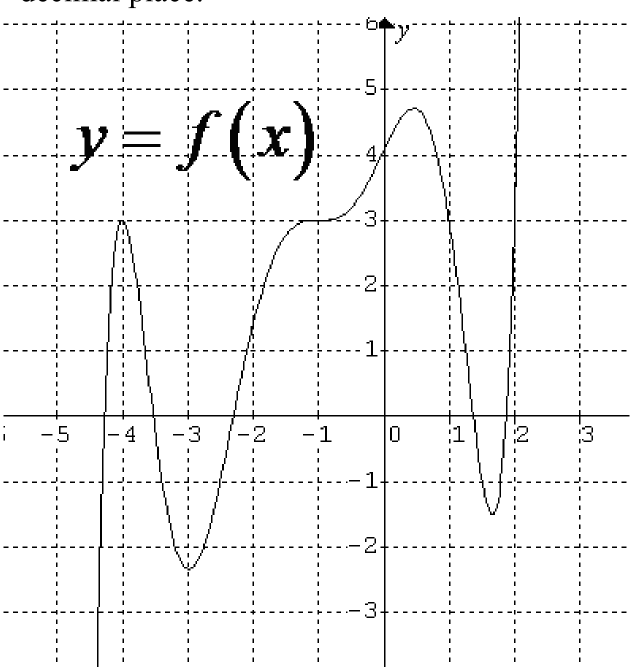
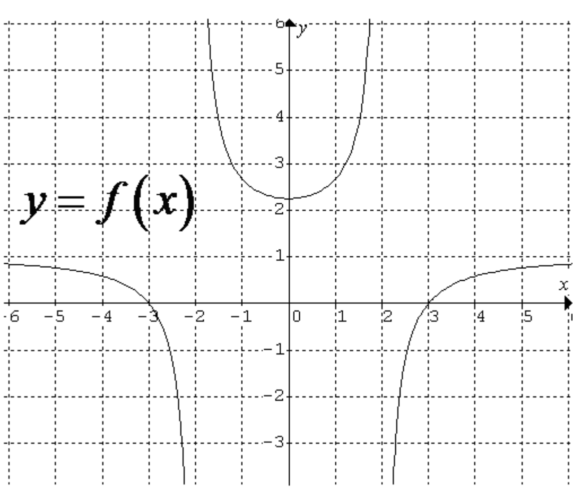
[2] Complete the sign lines for y' and y'' for each function whose graph is shown. Approximate values to 1 decimal place.



[a]

y' ______________________

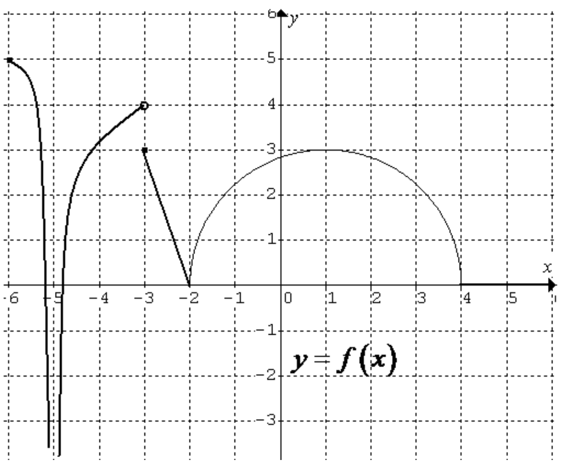
y'' ______________________



[b]

y' ______________________

y'' ______________________

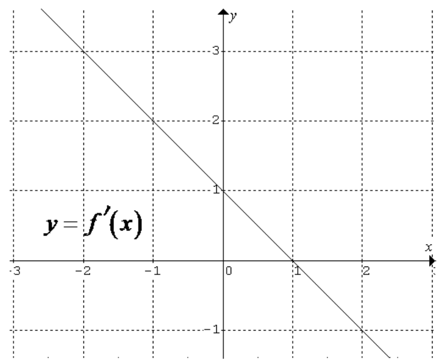


[c]

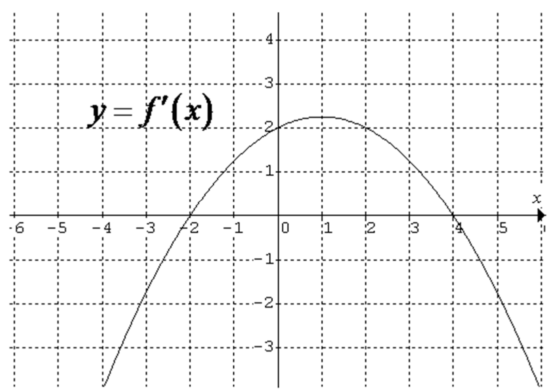
y' ______________________________

y'' ______________________________

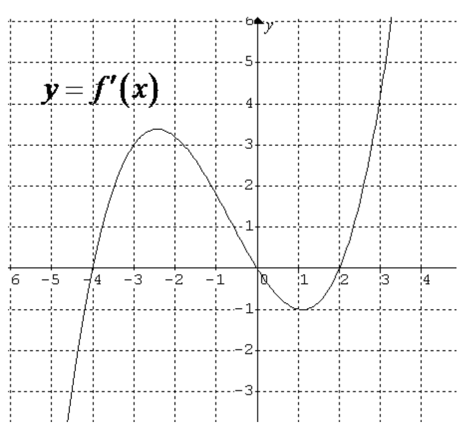
[3] The graph is for $y = f'(x)$, the derivative of $f(x)$.
Approximate the following to 1 decimal place.
[a] The interval(s) on which *f* is increasing.
[b] The *x*-value(s) at which *f* has a local minimum.
[c] The *x*-value(s) at which *f* has a local maximum.
[d] The interval(s) on which *f* is concave up.
[e] The *x*-value(s) at which *f* has a flex point.

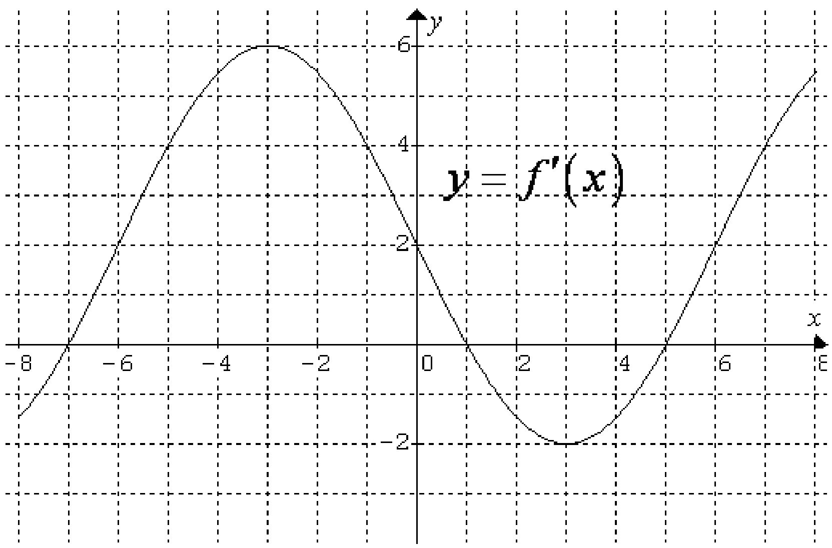


[4] The graph is for $y = f'(x)$, the derivative of $f(x)$.
Approximate the following to 1 decimal place.
[a] The interval(s) on which *f* is increasing.
[b] The *x*-value(s) at which *f* has a local minimum.
[c] The *x*-value(s) at which *f* has a local maximum.
[d] The interval(s) on which *f* is concave up.
[e] The *x*-value(s) at which *f* has a flex point.



[5] The graph is for $y = f'(x)$, the derivative of $f(x)$.
Approximate the following to 1 decimal place.2
[a] The interval(s) on which *f* is increasing.
[b] The *x*-value(s) at which *f* has a local minimum.
[c] The *x*-value(s) at which *f* has a local maximum.
[d] The interval(s) on which *f* is concave up.
[e] The *x*-value(s) at which *f* has a flex point.





[6] Shown here is the graph of $y = f'(x)$, <u>the derivative</u> of $y = f(x)$. The domain of $f(x)$ and $f'(x)$ is [-8, 8].

[a] State the interval (or union of intervals) on which $f(x)$ is increasing, concave up.

[b] State the interval (or union of intervals) on which $f(x)$ is decreasing, concave up.

[c] State the interval (or union of intervals) on which $f(x)$ is increasing, concave down.

[d] State the interval (or union of intervals) on which $f(x)$ is decreasing, concave down.

[e] List all the points at which $f(x)$ has a maximum.

[f] List all the points at which $f(x)$ has a minimum.

[g] List all the points at which $f(x)$ has a point of inflection.

[h] State the interval (or union of intervals) on which $f''(x)$ is positive.

[i] State the interval (or union of intervals) on which $f''(x)$ is decreasing.

[j] List all the points at which $f''(x)$ is zero.

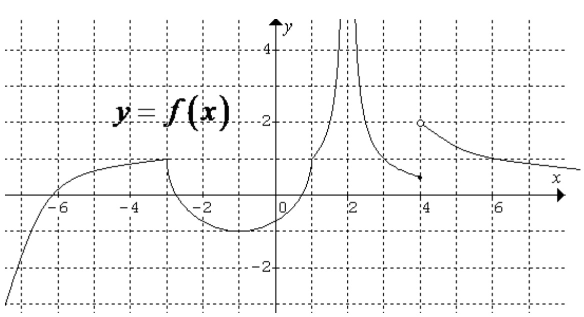
[k] Which is larger? $f(3)$ or $f(4)$

[l] Which is larger? $f(-1)$ or $f(1)$

[m] Which is larger? $f''(3)$ or $f''(6)$

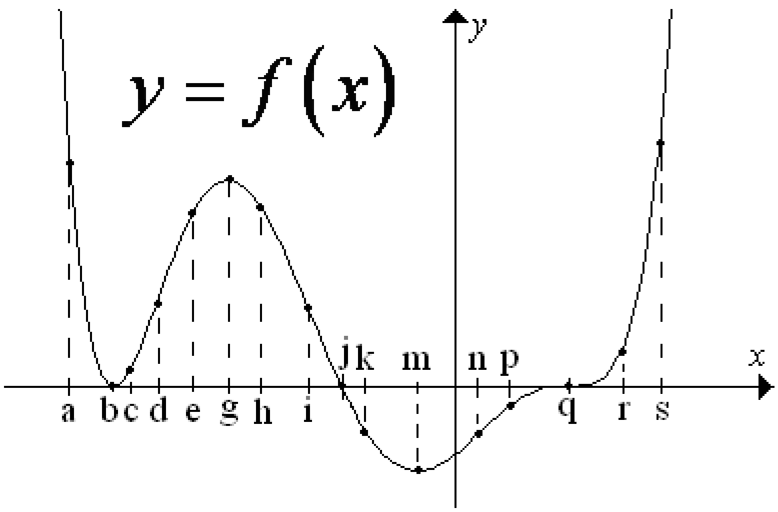
[n] Which is larger? $f''(0)$ or $f''(2)$

[7] Complete the sign lines for y' and y'' for the function whose graph is shown. Approximate values to 1 decimal place.



y' ____________________________________

y'' ____________________________________



[8] Shown here is the graph of $y = f(x)$.

[a] List all the points at which $f'(x)$ is positive.

[b] List all the points at which $f'(x)$ is zero.

[c] List all the points at which $f'(x)$ is increasing.

[d] List all the points at which $f'(x)$ has a maximum.

[e] List all the points at which $f'(x)$ has a minimum.

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[f] List all the points at which $f''(x)$ is zero. ____________________

[g] Which is larger? $f(g)$ or $f(m)$ _______

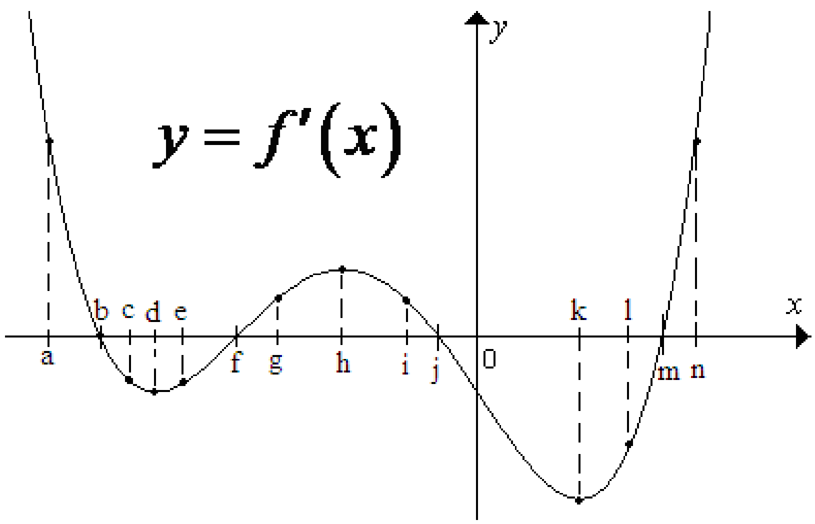
[h] Which is larger? $f'(e)$ or $f'(g)$ _______

[i] Which is larger? $f'(k)$ or $f'(m)$ _______

[j] Which is larger? $f'(c)$ or $f'(d)$ _______

[k] Which is larger? $f''(h)$ or $f''(i)$ _______

[l] Which is larger? $f''(p)$ or $f''(r)$ _______



[9] Shown here is the graph of $y = f'(x)$, <u>the derivative</u> of $y = f(x)$. In the following items, list 0 when appropriate as an answer.

[a] List the *x*-values for which $f(x)$ is increasing, concave up.

[b] List the *x*-values for which $f(x)$ is decreasing, concave up.

[c] List the *x*-values for which $f(x)$ is increasing, concave down.

[d] List the *x*-values for which $f(x)$ has a maximum.

[e] List the *x*-values for which $f(x)$ has a minimum.

[f] List the *x*-values for which $f(x)$ has a point of inflection.

[g] List the *x*-values for which $f''(x)$ is zero.

[h] Which is larger? $f(g)$ or $f(i)$

[i] Which is larger? $f(0)$ or $f(k)$

[j] Which is larger? $f''(b)$ or $f''(c)$

[k] Which is larger? $f''(0)$ or $f''(l)$

[10] The graph is for $y = f'(x)$, the derivative of $f(x)$.

Approximate the following to 1 decimal place.

[a] The interval(s) on which *f* is increasing.

[b] The *x*-value(s) at which *f* has a local minimum.

[c] The *x*-value(s) at which *f* has a local maximum.

[d] The interval(s) on which *f* is concave up.

[e] The *x*-value(s) at which *f* has a flex point.