AP Calculus BC – Unit 3, Part 1 Extra Practice

3.1 – Extra Practice

Evaluate the limit, using L'Hopital's Rule if necessary.

#18b. $\lim_{x\to 4}\dfrac{x^2-2x-8}{x-4}$

#19b. $\lim_{x\to 0}\dfrac{\sin(4x)}{\sqrt{x}}$

#20b. $\lim_{x\to 0}\dfrac{\sin(7x)}{x}$

#21b. $\lim_{x\to\infty}\dfrac{x^3}{e^{(x^2)}}$

#22b. $\lim_{x\to 3^-}\dfrac{x^2+2x}{x-3}$

#23. $\lim_{x\to 0}\dfrac{x}{\arctan(2x)}$

#24b. $\lim_{x\to\infty} x\tan\left(\frac{1}{x}\right)$

#25b. $\lim_{x\to 0^+} (x-2)^3 \ln(x)$

#26b. $\lim_{x\to 4^+} \left(3(x-4)\right)^{x-4}$

#26c. $\lim_{x\to\infty} x^{\left(\frac{1}{x}\right)}$

3.2 – Extra Practice

Without using a calculator, find the intervals where the function is increasing and decreasing, and find all relative maxima and minima.

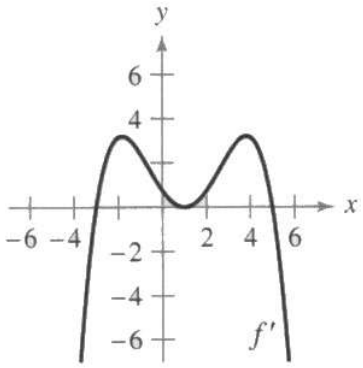
#8b. $f(x) = x^4 - 2x^2$

#9b. $f(x) = \dfrac{x^2}{2x-1}$

#10b. $f(x) = x - 2\cos x \quad for \quad 0 < x < 2\pi$

#11b. Use the graph of $f'(x)$ to find:

a) critical numbers of *f*
b) intervals on which *f* is increasing or decreasing
c) for each critical number state whether *f* has a relative maximum, relative minimum, or neither

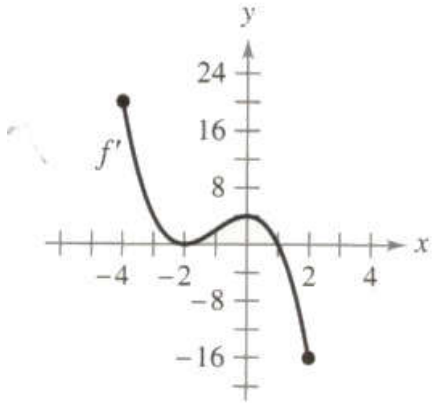


Without using a calculator, find the intervals where the function is concave up and concave down, and find all inflection points.

#12b. $f(x) = x^5 - 5x + 2$

#13b. $f(x) = x + \dfrac{2}{\sin x}$ *for* $\dfrac{-\pi}{2} < x < \dfrac{\pi}{2}$

#14b. Using the graph of the derivative of the function *f* on the interval [-4, 2]]:



a) On what interval(s) is *f* increasing / decreasing? Explain.

b) On what interval(s) is *f* concave up / concave down? Explain.

c) At what x-value(s) does *f* have relative extrema?

d) At what x-value(s) does *f* have inflection points?

3.3 – Extra Practice

Determine whether the Mean Value Theorem or Rolle's Theorem can be applied for the specified function and interval, and if it can be applied, find all *x*-values in the interval where the instantaneous rate of change equals the average rate of change:

#8b. $f(x) = x^2 - x - 12 \quad over \quad [-2, 4]$

#9b. $f(x) = (x+3)\ln(x+3) \quad over \quad [-2, -1]$

#10b. $f(x) = \tan x \quad over \quad [0, \pi]$

#11b. $f(x) = (x-1)(x-2)(x-3) \quad over \quad [1, 3]$

3.4 – Extra Practice

Without using a calculator, find the absolute maximum and absolute minimum value of the function over the given interval:

#3b. $f(x) = x^3 - \frac{3}{2}x^2 \quad over \quad [-1, 2]$

#4b. $f(x) = 3\cos x \quad over \quad [0, 2\pi]$