Quiz 7.4 – The Extreme Value Theorem and Optimization

1. (1 pt) alfredLibrary/AUCI/chapter7/lesson4/quiz/EVTTF1pet.pg
In each case, decide whether the function satisfies the hypothesis of the Extreme Value Theorem on the given interval. (Hint: The hypothesis of the EVT contains two conditions.)

Notice that you only have a limited number of attempts.

[?] 1. $f(x) = \frac{1}{x}$ on $(0,3)$
[?] 2. $f(x) = x^2$ on $[-2,3]$
[?] 3. $f(x) = \frac{1}{x}$ on $(\frac{1}{2},3)$
[?] 4. $f(x) = \sin^{-1}(x)$ on $[\frac{-1}{2},\frac{1}{2}]$
[?] 5. $f(x) = x^2$ on $(-2,3)$
[?] 6. $f(x) = \frac{1}{x}$ on $[\frac{-1}{2},3]$
[?] 7. $f(x) = \frac{1}{x}$ on $[\frac{1}{2},3]$

2. (1 pt) alfredLibrary/AUCI/chapter7/lesson4/quiz/EVT1pet.pg
Let $f(x) = 2x^3 - 33x^2 + (-156)x$. Complete this problem without a graphing calculator.

(a) The derivative of $f(x)$ is $f'(x) =$ __________.

(b) As a comma-separated list, the critical points of f are $x =$ __________.

Since f is continuous on the closed interval $[-3,21]$, f has both an absolute maximum and an absolute minimum on the interval $[-3,21]$ according to the Extreme Value Theorem. To find the extreme values, we evaluate f at the endpoints and at the critical points.

(c) As a comma-separated list, the y-values corresponding to the critical points and endpoints are $y =$ __________.

(d) The minimum value of f on $[-3,21]$ is $y =$ __________,
the minimum value occurs at $x =$ __________,
and this x is a(n) [?].

(e) The maximum value of f on $[-3,21]$ is $y =$ __________,
the maximum value occurs at $x =$ __________,
and this x is a(n) [?].

3. (1 pt) alfredLibrary/AUCI/chapter7/lesson4/quiz-/optimization1pet.pg
A cylindrical can without a top must be constructed to contain $V = 2500 cm^3$ of liquid. Find the base radius r and height h that will minimize the amount of material needed to construct the can.

Base radius $r =$ __________ cm
Height $h =$ __________ cm