Section 4.3
42

use second derivative test to classify each point as a relative maximum, relative minimum, or neither

$$f(x) = (x^2 - 3x + 1)e^{-x} \qquad \text{at } x=1, \ x=4$$

$$f'(x) = -e^{-x}(x^2 - 3x + 1) + e^{-x}(2x - 3)$$

$$= e^{-x}(-x^2 + 5x - 4)$$

$$f''(x) = -e^{-x}(-x^2 + 5x - 4) + e^{-x}(-2x + 5)$$

$$= e^{-x}(x^2 - 7x + 9)$$

$f'(1) = e^{-1}(0) = 0$

$f''(1) = e^{-1}(3) > 0$

so $x = 1$ is a relative minimum

$f'(4) = e^{-4}(0) = 0$

$f''(4) = e^{-4}(-3) < 0$

so $x = 4$ is a relative maximum

Section 4.2
22

Rolle's theorem cannot be applied because $f(x)$ is Not continuous on $[0, 2\pi]$

Section 4.1
5

Find the critical numbers and tell whether each yields a maximum, minimum, or neither.

I didn't grade this one.

$f(x) = x^3$ on $[-\frac{1}{2}, 1]$

$f'(x) = 3x^2$

$0 = 3x^2$

$\boxed{0 = x}$ critical Number

$f(-\frac{1}{2}) = \frac{-1}{8}$

$f(0) = 0$

$f(1) = 1$

So $x=0$ gives Neither a maximum Nor a minimum.