Section 4.1

1.

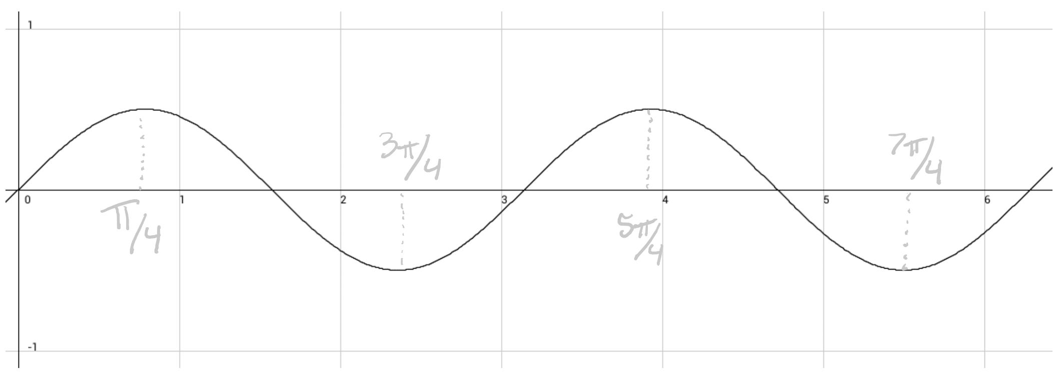
a.

$$\frac{d}{dx}\left[\sin(x)\cos(x)\right] = \cos^2(x) - \sin^2(x) = 0$$

$$\Rightarrow \cos^2(x) = \sin^2(x)$$

$\boxed{x = \pi/4,\ 3\pi/4,\ 5\pi/4,\ 7\pi/4 \text{ ARE CRITICAL POINTS OF } f(x)}$

b.



$\boxed{\begin{array}{l} x = \pi/4,\ 5\pi/4 \text{ ARE LOCAL MAXIMA.} \\ x = 3\pi/4,\ 7\pi/4 \text{ ARE LOCAL MINIMA.} \end{array}}$

2.

a. $\frac{d}{dx}\left[f(x)\right] = \frac{d}{dx}\left[x\sqrt{2-x^2}\right] = \frac{d}{dx}\left[x(2-x^2)^{1/2}\right] = 0$

$$\Rightarrow \quad 0 = (2-x^2)^{1/2} - x^2(2-x^2)^{-1/2}$$

$$0 = (2-x^2)^{-1/2}\left[(2-x^2) - x^2\right]$$

$$0 = (2-x^2)^{-1/2}\left(\tfrac{1}{2}\right)(1-x^2)$$

$$x = \boxed{\pm 1, \pm\sqrt{2}}$$

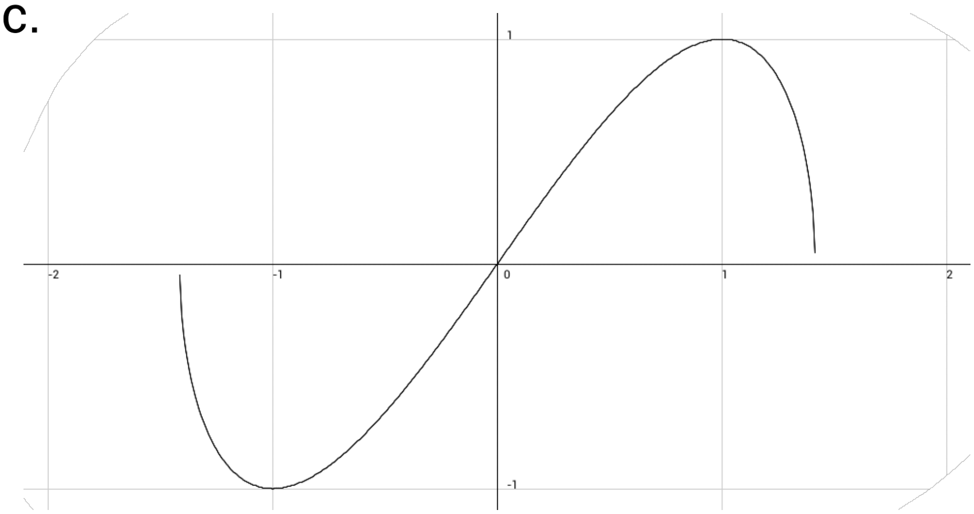
b. PLUG 'N CHUG

$f(\pm\sqrt{2}) = 0$

$\boxed{f(1) = 1}$ ABS MAX

$\boxed{f(-1) = -1}$ ABS MIN

c.



Section 4.2

1.

THIS ONE'S UP TO YOU

2.

a. $0 = f'(x) = 6x^2 + 6x - 12$

$0 = 6(x^2 + x - 2)$

$0 = 6(x-1)(x+2)$

$\Rightarrow x = -2, 1$ BUT $-2 \notin (-2, 4)$

SO ONLY CRITICAL POINT AT $\boxed{x = 1}$

b. $f'(0) = -12$, $f'(2) = +24$

So $x = 1$ CORRESPONDS TO A LOCAL MIN.

c. $f(-2) = 21$

$\boxed{f(1) = -6}$ ABSOLUTE MIN

$\boxed{f(4) = 129}$ ABSOLUTE MAX

4. $0 = p'(x) = -\dfrac{x^2 - 8x - 20}{(x^2+20)^2}$

$$0 = -\frac{(x-10)(x+2)}{(x^2+20)^2}$$

$\Rightarrow$ CRITICAL POINTS AT $\boxed{x = -2, 10}$

$$p''(x) = \frac{2(x^3 - 12x^2 - 60x + 80)}{(x^2+20)^3}$$

$p''(-2) = 1/48$, $p''(10) = -1/1200$,

$$\boxed{\begin{array}{l} \text{LOCAL MIN AT } x = -2 \\ \text{LOCAL MAX AT } x = 10 \end{array}}$$