(1) $f'(x) = x^2 - 3x + 2 = 0$ where $(x-1)(x-2) = 0$, that is, at $x = 1$ and $x = 2$.

$f''(x) = 2x - 3$.

$f''(1) = 2 - 3 = -1 < 0$, so $x = 1$ corresponds to a local maximum.

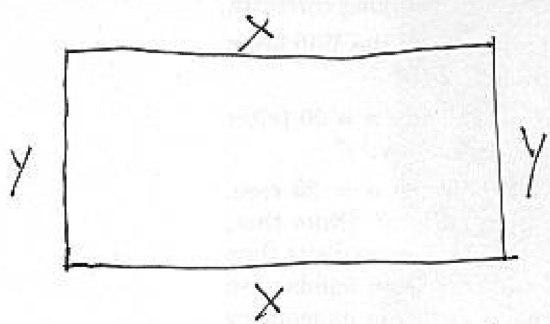
$f''(2) = 4 - 3 = 1 > 0$, so $x = 2$ corresponds to a local minimum.

(2) We list the possible candidates:

x	$f(x)$	
-3	-28.5	← min
3	1.5	← max
1	$.8\bar{3}$	
2	$.\bar{6}$	

Thus, the global maximum is 1.5, and it occurs at the endpoint $x = 3$, while the global minimum is -28.5, and it occurs at the endpoint $x = -3$.

(3)



We want to minimize

$C = 5x + 10x + 3y + 3y$
$= 15x + 6y$

subject to $xy = 100{,}000$.

This gives $y = 100000/x$, so

$C(x) = 15x + \frac{600{,}000}{x}$. $C'(x) = 15 - \frac{600{,}000}{x^2} = 0$

$\Rightarrow x^2 = 40{,}000 \Rightarrow \boxed{x = 200 \text{ ft}, \ y = 500 \text{ ft}}$. ~~However,~~

~~This~~ is apparently a ~~maximum~~ minimum cost, since $C''(x) = \frac{300{,}000}{x^3} > 0$.

The minimum cost is thus

$\$(15(200) + 6(500)) = \$6{,}000$.

(4) $I = V/R$. $\frac{dI}{dt} = \frac{dI}{dR}\frac{dR}{dt} = \frac{-V}{R^2}\frac{dR}{dt}$.

Thus, $\frac{dI}{dt} = \frac{-12}{2^2}(.5) = \boxed{-1.5 \text{ amperes per second}}$.

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(5) (a) $\lim_{x \to 0} \frac{\sin^2 x}{x^2} = \lim_{x \to 0} \frac{2\sin x \cos x}{2x} = \lim_{x \to 0} \frac{\sin(2x)}{2x}$

$= \lim_{x \to 0} \frac{2\cos 2x}{2} = \boxed{1}$.

(b) $\lim_{x \to \infty} \frac{\ln(x)}{x} = \lim_{x \to \infty} \frac{\frac{1}{x}}{1} = 0$.

(c) $\lim_{x \to \infty} \frac{x^2+3x+2}{x^2 \ln x} = \lim_{x \to \infty} \frac{2x+3}{2x\ln x + x}$

$= \lim_{x \to \infty} \frac{2}{2\ln x + 2 + 1} = \boxed{0}$.