(1.) (2 pts each) **True / False**--Circle your choice. Circle **T** only if the statement is ***always*** true.
[No explanation necessary.]

(a) If a function is differentiable, then it is continuous. **T** **F**

(b) If a function is continuous, then it is differentiable. **T** **F**

(c) If $f'(x)$ is increasing, then f is concave up. **T** **F**

(d) If $f''(x) = -3$, then f is decreasing. **T** **F**

(e) If f has a critical point at $x=3$, then f has a local maximum or a local minimum at $x=3$. **T** **F**

(2.) Given :

$r(2) = 2$	and	$s(2) = 1$
$r(4) = -1$		$s(4) = 2$
$r'(2) = 5$		$s'(2) = 3$
$r'(4) = -3$		$s'(4) = 4$

Determine the values indicated below ***or*** state clearly what information is needed (and not supplied) to determine the requested value. In each case, first determine a general formula for the derivative function and then find the requested value (if possible). [Circle your answers.]

(3 pts each) Find:

(a) $H'(2)$ if $H(x) = ln(r(x))$

$H'(x) = \frac{1}{r(x)} \cdot r'(x) \rightarrow H'(2) = \frac{1}{r(2)} \cdot r'(2) = \frac{1}{2} \cdot 5 = \frac{5}{2}$

(b) $H'(2)$ if $H(x) = \dfrac{s(x)}{r(x)}$

$H'(x) = \dfrac{s'(x)r(x) - s(x) \cdot r'(x)}{(r(x))^2} \rightarrow H'(2) = \dfrac{3(2) - (1)(5)}{(2)^2}$

$= \frac{1}{4}$

(c) $H'(2)$ if $H(x) = \sqrt{s(x)} = (s(x))^{1/2}$

$H'(x) = \frac{1}{2} (s(x))^{-1/2} \cdot s'(x)$

$\rightarrow H'(2) = \frac{1}{2} (s(2))^{-1/2} \cdot s'(2) = \frac{1}{2} (1)^{-1/2} \cdot 3 = \frac{3}{2}$