6. A particle moves according to a law of motion $s(t) = t^2 - 6t + 8$, $t \geq 0$, where t is measured in seconds and s in feet. | 10 pts |

(a) When is the particle moving to the left?

$s'(t) = 2t - 6$

$2t - 6 < 0 \iff t < 3.$

It moves left for $0 \leq t < 3$ sec.

(b) What is the total distance traveled during the first 4 seconds?

$|s(4) - s(3)| + |s(3) - s(0)|$

$s(4) = 16 - 24 + 8 = 0$

$s(3) = 9 - 18 + 8 = -1$

$s(0) = 8$

$= |0 + 1| + |-1 - 8|$

$= 1 + 9 = 10$

It travels 10 ft. during the first 4 sec.

7. Find the equation of the tangent line to the curve given by $y = x + \sqrt{x}$ at the point $(1, 2)$. | 6 pts |

$y - 2 = \left.\frac{dy}{dx}\right|_{x=1} (x - 1).$

$\frac{dy}{dx} = 1 + \frac{1}{2}x^{-1/2} = 1 + \frac{1}{2}\frac{1}{\sqrt{x}}, \quad \left.\frac{dy}{dx}\right|_{x=1} = \frac{3}{2}.$

$y - 2 = \frac{3}{2}(x - 1)$

8. Find $f'(4)$ if $f(x) = \sqrt{x}g(x)$, where $g(4) = 8$, and $g'(4) = 6$. | 6 pts |

$f'(x) = \sqrt{x}\, g'(x) + g(x)\, \frac{1}{2}x^{-1/2}$

$= \sqrt{x}\, g'(x) + g(x)\, \frac{1}{2\sqrt{x}}$

$f'(4) = 2\, g'(4) + g(4)\, \frac{1}{4}$

$= 2 \cdot 6 + 8 \cdot \frac{1}{4} = 12 + 2 = \underline{\underline{14}}$