Section 3.7: Additional Problems Solutions

1. $f'(t) = 2te^{-t} - t^2e^{-t} = (2t - t^2)e^{-t}$

   Setting $f'(t) = 0$ gives $t = 0$ and $t = 2$. The partical is at rest at $t = 0$ and $t = 2$.

   $f(0) = 0$, $f(2) = 4e^{-2} \approx 0.5413$ and $f(6) = 36e^{-6} \approx= 0.0892$

   Displacement is $f(6) - f(0) = 36e^{-6} - 0 = 36e^{-6} \approx= 0.0892$

   Total distance traveled is
   $\Big(f(2) - f(0)\Big) + \Big(f(2) - f(6)\Big) = 4e^{-2} - 0 + 4e^{-2} - 36e^{-6} \approx 0.9934$

2. $f'(t) = \dfrac{81 - 9t^2}{(t^2 + 9)^2}$

   Setting $f'(t) = 0$ gives $t = \pm 3$. The partical is at rest at $t = 3$.

   $f(0) = 0$, $f(3) = 1.5$ and $f(6) = 1.2$

   Displacement is $f(6) - f(0) = 1.2 - 0 = 1.2$

   Total distance traveled is
   $\Big(f(3) - f(0)\Big) + \Big(f(3) - f(6)\Big) = 1.5 - 0 + 1.5 - 1.2 = 1.8$