Calculus I - Quiz 2 Name: Solutions

(All work must be shown clearly to get full credit. Calculators are *not* allowed in this quiz.)

1.[5 pts] Find the derivative of $h(z) = \dfrac{\cos(e^{-z^2})}{z^2}$.

2.[5 pts] The position of a particle is given by $s(t) = \sqrt{13+4t}$. Find the velocity and acceleration of the particle at time $t = 3$.

(1) $h'(z) = \dfrac{z^2\left(-\sin(e^{-z^2})\cdot e^{-z^2}(-2z)\right) - \cos(e^{-z^2})\cdot 2z}{z^4}$

$= \dfrac{2z^3 \sin(e^{-z^2})\cdot e^{-z^2} - 2z\cos(e^{-z^2})}{z^4}$

$= \dfrac{2\left(z^2\sin(e^{-z^2})\cdot e^{-z^2} - \cos(e^{-z^2})\right)}{z^3}$

(2) $s(t) = \sqrt{13+4t} = (13+4t)^{1/2}$

$v(t) = s'(t) = \dfrac{1}{2\sqrt{13+4t}}\cdot 4$

$\therefore v(3) = \boxed{\dfrac{2}{5}}$

$a(t) = s''(t) = \left(\dfrac{2}{\sqrt{13+4t}}\right)' = 2\left((13+4t)^{-1/2}\right)'$

$= 2\cdot\left(-\tfrac{1}{2}\right)(13+4t)^{-3/2}\cdot 4$

$= -\dfrac{4}{(13+4t)^{3/2}}$

$a(3) = \boxed{-\dfrac{4}{125}}$