The following is an eigenfunction of the momentum operator \([p]\):

(a) \(\sin(kx)\)
(b) \(e^{ikx} - e^{-ikx}\)
(c) \(\sin(kx) - i\cos(kx)\)
(d) \(\sin(kx) - \cos(kx)\)
(e) \(e^{\sin(kx)}\)
The following is an eigenfunction of the squared momentum operator $[p^2]$:

(a) $e^{ikx} \sin(kx)$
(b) $\sin(kx) \cos(kx)$
(c) $e^{ikx} - e^{-2ikx}$
(d) $x^2$
(e) none of the above or all of the above
Which of these is true?

(a) A particle in a finite square well is in an eigenfunction of [$p^2$]
(b) A particle in potential $U(x)=kx^2$ is in an eigenfunction of [$p^2$]
(c) A particle in a box is in an eigenfunction of [$p^3$]
(d) A particle in a box is in an eigenfunction of [$p^4$]
(e) A particle in a box is in an eigenfunction of [$p$]
For particles with energy $E$ that are incident on the two barriers shown above, the transmission probability is $T_1$ for barrier 1, $T_2$ for barrier 2.

(a) For any $E < U_0$, $T_1 > T_2$
(b) For any $E < U_0$, $T_1 < T_2$
(c) For any $E < U_0/2$, $T_1 > T_2$
(d) For any $E < U_0/2$, $T_1 < T_2$
(e) There is no $E$ for which $T_1 = T_2$
A particle is in a harmonic oscillator potential and has energy 1eV. It is possible that:

(a) It absorbs photons of energy 1eV
(b) It absorbs photons of energy 0.8eV
(c) It absorbs photons of energy 0.6eV
(d) It absorbs photons of energy 0.4eV
(e) none of the above or all of the above