A.  
1. A car that has zero acceleration; must have zero velocity. Circle the correct answer below (3 points).
   
   A. No
   B. Yes

2. A car slows down from +20.0 m/s to rest in a distance of 80 m. What was its acceleration? (4 points)

   \[
   a = \frac{v_f^2 - v_i^2}{2s} = \frac{(0)^2 - (20.0 \text{ m/s})^2}{2 \times 80 \text{ m}} = \frac{-400 \text{ m/s}^2}{160 \text{ m}} = -2.50 \text{ m/s}^2
   \]

3. Can an airplane have a southward velocity and a northward acceleration? (3 points)

   (a) true
   (b) false
B.1. A student drops a ball from the top of a 200 m high cliff. Assume the ball falls straight down and has a zero initial velocity. Assume the magnitude of the acceleration of gravity \( g \) is \(-9.80\ \text{m/s}^2\). Ignore air resistance. Show all work including equations and units for full or partial credit. (10 points total)

(a) Draw a picture including reference frame and labeling the axis. (1 point)

\[
\begin{array}{c}
\text{\textbullet} \\
\hline
\hline
\end{array}
\]

(b) How long does it take for the ball to fall straight down to the bottom of the cliff? (3 points)

\[
y = y_0 + v_0 t + \frac{1}{2} at^2
\]

\[
0 = 200\ \text{m} + 0 + \frac{1}{2} (-9.80\ \text{m/s}^2) t^2
\]

\[
t = \pm 6.39\ \text{s}
\]

(c) What is the velocity of the ball just before hitting the ground? (3 points)

\[
v = v_0 + at
\]

\[
= 0 + (-9.80\ \text{m/s}^2)(6.39\ \text{s})
\]

\[
= -62.6\ \text{m/s} \quad \text{downwards}
\]

(d) If the student tosses the ball straight up with initial velocity of 4.00 m/s, how high does the ball go above its release point? (3 points)

\[
v^2 = v_0^2 + 2a(y - y_0)
\]

\[
0 = (4.00\ \text{m/s})^2 + 2(-9.80\ \text{m/s}^2)(y - y_0)
\]

\[
(y - y_0) = 0.816\ \text{m}
\]