Motion Equations - Problem Worksheet - HW 1

1) An Indy-500 race car's velocity increases from +4.0 m/s to +36 m/s over a 4s period. What is the acceleration?
2) The Indy-500 race car then slows from +36 m/s to +15 m/s over 3.0 s. What is the acceleration over this time interval?
3) A car is coasting backwards down a hill at -3.0 m/s when the driver gets the engine started. After 2.5s, the car is moving uphill at a velocity of +4.5 m/s. What is the car's acceleration?
4) A bus is moving at 25 m/s. The driver steps on the brakes, and the bus stops in 3.0 s. What is the acceleration of the bus while braking?
9) A golf ball rolls up a hill toward a Putt-Putt hole.
   a) If it starts with a velocity of +2.0 m/s and accelerates at - 0.5 m/s^2, what is its velocity after 2.0 s?
   b) If the acceleration occurs for 6.0 s, what is its final velocity?
   c) Describe in words, the motion of the golf ball.
10) A bus traveling at +30 km/hr accelerates at a constant +3.5 m/s^2 for 6.8 s. What is its final velocity in km/hr?
11) If a car accelerates from rest at a constant 5.3 m/s^2, how long will it take to reach 28 m/s?
12) A car slows from 22 m/s to 3 m/s with an acceleration of -2.1 m/s^2. How long does this take?
13) A race car traveling at +44 m/s is accelerated to a velocity of +22 m/s over an 11 s interval. What is the displacement during this time?
14) A rocket traveling at +88 m/s is accelerated to +132 m/s over a 15 s interval. What is its displacement during this time?
15) A car accelerates from 15 m/s to 25 m/s while it travels 125 m. How long does this motion take?
16) A bike rider accelerates to a velocity of 7.5 m/s during 4.5 s. The bike's displacement is +19 m. What was the initial velocity of the bike?
17) An airplane starts from rest and accelerates at +3 m/s^2 for 30 s before leaving the ground. What is the displacement during this time?
18) Starting from rest, a race car moves 110 m in the 5.0 s of uniform acceleration. What is the car's acceleration?
19) A driver brings a car traveling at +22 m/s to a full stop in 2 s.
   a) What is the car's acceleration?
   b) How far does it travel before stopping?
20) A biker passes a lamppost at the crest of a hill at +4.5 m/s. She accelerates down the hill at 4.0 m/s^2 for 12 s. How far does she move down the hill in this time?
21) An airplane accelerates from a velocity of 21 m/s at a rate of 3 m/s^2 over +535 m. What is its final velocity?
22) The pilot stops a plane in 484 m using an acceleration of -8 m/s^2. How fast was the plane moving before braking began?
23) A person wearing a shoulder harness can survive a car crash if the acceleration is smaller than -300 m/s^2. How far must the front end of a car collapse if it crashes while going 101 km/hr?
24) A car is initially sliding backwards down a hill at -25 km/hr. The driver guns the car. By the time the car's velocity is +35 km/hr, it is +3.2 m from its starting point. Find the acceleration.