NAME: _____ **DATE:** _____

AVI 2000 Exam II:
Fundamentals of Lift, Types of Airplane Stability, and Airplane Control Surfaces

1. What is the scientific principle that explains how an airplane generates lift?
    a) First Law of Thermodynamics
    b) Bernoulli's Principle
    c) Boyle's Law
    d) Pascal's Law

2. Draw and label the THREE axes of rotation on an aircraft.

3. How does the use of flaps affect an aircraft's stall speed?

4. The angle between the wing and the oncoming air is known as:
    a) Aileron
    b) Flap
    c) Angle of Attack
    d) Rudder

5. Explain/Describe the FOUR forces acting on an airplane in flight.

6. Explain/Describe what happens (and why) to lift when the angle of attack of a wing increase (AoA is **NOT** beyond the critical angle of attack).

7. Explain/Describe longitudinal stability in an airplane.

8. Explain/Describe the effect/s of adding thrust to a stable airplane trimmed to maintain level and flight.

    BOTH:

    Short term:

    Long term:

9. When in a fully developed stall, which control surface is **NOT** used to correct for roll?
    a) Ailerons
    b) Elevators
    c) Rudder
    d) Flaps

10. The force that opposes the motion of an airplane through the air is called:
    a) Thrust
    b) Lift
    c) Weight
    d) Drag

11. _____ is the force that acts opposite to drag during flight.

12. _____ is the only force acting vertically on an airplane during flight.

13. In an **unstable** aircraft, what happens when a disturbance causes it to roll?

14. Which part of an airplane's control system is most responsible for controlling the aircraft's pitch?
    a) Elevator
    b) Aileron
    c) Rudder
    d) Flaps

15. Explain/Describe Density Altitude (must include temperature and humidity)

16. What is the critical angle of attack?
    a) The maximum angle of attack before the aircraft stalls
    b) The angle of attack at which the aircraft achieves its maximum speed
    c) The angle of attack at which the aircraft generates the least lift
    d) The angle of attack that is irrelevant to lift generation

17. Explain/Describe lateral stability in an airplane.

18. Explain/Describe the effects on **stability and performance** of an airplane with an AFT center of gravity.

19. Which of the following axes of an aircraft is associated with pitch?

20. Which of the following statements is true about lift?
    a) Lift is a rearward force.
    b) Lift is not affected by airspeed.
    c) Lift is not proportional to the angle of attack.
    d) Differences in air pressure create lift.

21. In a s**table** aircraft, what happens when a disturbance causes it to pitch up?

22. What is the purpose of wing flaps on an aircraft?
    a) To increase lift and reduce drag
    b) To decrease lift and increase drag
    c) To provide stability during turns
    d) To control yaw

23. Explain/Describe the difference between the TWO types of stability (Static, Dynamic).

24. The axis of an aircraft associated with roll?

25. _____ is the term for the resulting condition in which an aircraft wing exceeds the critical angle of attack.

26. Explain/Describe the primary flight control surfaces on an airplane.

27. Which control surface is used to control the roll of the aircraft?

28. What is the term for the control surfaces that are located on the trailing edge of the wings and can be extended to increase lift and drag?

29. What is the **primary** factor affecting the lift generated by an airplane wing?
    a) Wing shape
    b) Air temperature
    c) Aircraft weight
    d) Engine power

30. Which control surface is used to control the yaw of the aircraft?

31. What is the function of the trim tabs on control surfaces?

32. Explain/Describe how ailerons work to control roll.

33. What control surface is commonly used to slow an aircraft during landing?

34. Describe how rudders work to control yaw.

35. What is elevator trim maintaining in straight and level flight?
    a. Altitude
    b. airspeed
    c. Heading
    d. Pitch

36. What are the THREE typical control inputs (changes from straight and level cruise flight) for an aircraft to perform a climb?

37. What are the THREE typical control inputs (changes from straight and level cruise flight) for an aircraft to perform a descent?

38. What is the purpose of a flaps system on an aircraft?

39. Which control surface is used to control the pitch of the aircraft?

40. Explain/Describe how elevators work to control pitch.

41. **WORTH 20 POINTS:**

    Explain/Describe each type of:

    Static Stability (10 Points)
        Positive
        Neutral
        Negative

    Dynamic Stability (10 Points)
        Positive
        Neutral
        Negative