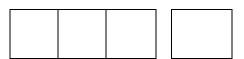
AEM 368: Practice Exan	n 1 Name:		
18 Feb 2017	120 minutes	6 Pages	Open book, Open notes, Calculator
100 total points	Read, th	ink, plan, and th	en write.

University of Alabama Academic Honor Pledge:

I promise or affirm that I will not at any time be involved with cheating, plagiarism, fabrication, or misrepresentation while enrolled as a student at The University of Alabama. I have read the Academic Honor Code, which explains disciplinary procedures that will result from the aforementioned. I understand that violation of this code will result in penalties as severe as indefinite suspension from the University.

Signature:_____

Date:			



Multiple Choice Problems: Circle EVERY correct answer [2 pts each]

1. Give	. Given $\alpha = 0^{\circ}$ and $\beta = 5^{\circ}$ for a freestream flow of $V_{\infty} = 100$ ft/s, compute the body-frame y velocity.						
А.		В.	C.	D.	E.	Not Valid	
2. Twis	2. Twisting the wingtips TED is called						
A. V	Vashin	B. Washout	C. Elliptical	D. Spoilers	E.	None of the above	
3. Com	pute the dens	sity of dry air at 100) F and 14.7 psi.				
А.		В.	C.	D.	E.	None of the above	

4. For a Tropic Standard Atmosphere, what is the pressure ratio δ at 52493 ft?

А.		В.	С.	D.	E. None of t	he above
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5. Which aircraft instrument only uses static pressure

. Airspeed	Airspeed Altimeter	B. VOR	C. Mach meter	D. None of the above
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6. If the static port becomes clogged (i.e. closed) at 5000 ft and 100 kts, which value would the vertical speed indicator show for a 1500 fpm climb (assuming the static port remains closed and does not leak)?

A	. 0 fpm	B. 1500 fpm	C1500 fpm	D. Not enough information	E.	None of the above	
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7. Compute the lift coefficient of a 300 ft² wing generating 7000 lbs of lift at 100 ft/s at SSL.

	А.	В.	С.	D.	E.	
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8. Given a surface temperature of 30 C and a dewpoint of 25 C, estimate the altitude where the clouds form (the cloud base).

A.	0 ft	B. 2000 ft	C. 4000 ft	D. 4500 ft	E. None of the above
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9. One knot is how many miles per hour?

A. 0	B. 0.86	C. 1	D. 1.15	E. None of the above	

10. Given a 200 kt aircraft with a West heading flying in a 40 kt wind from 195 degrees, what is the groundspeed?

А.	В.	C.	D.	E. None of the above
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11. On a standard day at 35000 ft, the IAS is 800 kts. If CAS=IAS+5, what is the true airspeed?

1	А.	В.	C.	D.	E.	None of the above
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12. A 5 ft diameter propeller develops 300 lbf of thrust at 60 mph, what is the propulsive efficiency?

А.	В.	С.	D.	E. None of the above
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13. A Piper Commance has 400 hp at SSL. Estimate the horsepower at 24000 ft on a standard day.

А.	В.	C.	D.	E.	None of the above	

14. Compute the efficiency of a 10 inch propeller at 30 mph at 6000 rpm. The propeller is generating 4 lbs of thrust and requires 746 Watts (i.e. 1 hp) at SSL.

А.	В.	C.	D.	E.	None of the above	
						Ľ

15. Decreasing the pressure ratio for a piston engine

A. Increases	B. Decreases		
Thermodynamic	Thermodynamic	C. No change	D. None of the above
Efficiency	Efficiency		

16. Estimate the power of a 2000 hp (at SSL) turboprop engine operating at 10000 ft and Mach 0.6.

А.	В.	C. 2000	D.	E. None of the above
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17. For a propulsive efficiency of 50%, which of the following is true?

	А.	В.	С.	D.	E. Not possible
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18. Which is most likely to be the SFC [lb/hr/hp] for a piston engine?

	Α.	В.	C.	D.	E. None of the above	
19	9. A particle moves	particle moves along the path $s(t) = \begin{pmatrix} x(t) \\ y(t) \end{pmatrix} = \begin{pmatrix} e^t \\ t \end{pmatrix}$. Compute the radius of curvature at $t = 1$.				
	А.	В.	C.	D.	E. None of the above	

20. For an aircraft operating 10 kts slower than the minimum power airspeed, which is true?

F.	Front side of power curve	G. The aircraft is speed stable	H. Two velocities are possible at the power setting	I. $\left(\frac{C_L}{C_D}\right)_{\max}$	J. Faster than minimum thrust airspeed
			setting		

[60 pts] Multipart Aircraft Performance Questions based on the Lockheed P-80, the first operational US jet fighter.

- 4600 lbf turbojet.
- Wingspan 39 ft
- Wing area 234 sq-ft
- Oswald Efficiency e=0.8
- Gross weight 12000 lbf
- 3000 pounds JetA
- Zero lift drag coefficient 0.0134
- CLmax = 2.0



- 21. [10 pts] Estimate the maximum SSL airspeed.
- 22. [10 pts] Estimate the range in nautical miles (6076 feet = 1 nm) at 19000 ft.
- 23. [10 pts] Estimate the balanced field length for a 50 foot obstacle
- 24. [10 pts] Estimate the absolute ceiling
- 25. [10 pts] Estimate the time to climb from SSL to 19000 ft