PRINCE OF SONGKLA UNIVERSITY

FACULTY OF ENGINEERING

Midterm Examination: Semester I — Academic Year: 2011

Date: August 4, 2011 — Time: 13:30-16:30

Subject: 226-302 Computer Aided Manufacturing — Room: A400, S101

Instructions

- **All books, calculator, and dictionary are allowed.**
- Write your answer in this exam paper only, show your work clearly and legibly.
- There are 20 questions on 11 pages.

ทุจริตในการสอบ โทษขั้นต่ำ คือ พักการเรียน 1 ภาคการศึกษา และปรับตกในรายวิชาที่ทุจริต

Question #	Full Score	Assigned Score	Question #	Full Score	Assigned Score
1	20		11	10	
2	10		12	10	
3	10		13	4	
4	10		14	10	
5	10		15	6	
6	10		16	20	
7	10		17	10	
8	6		18	10	
9	8		19	6	
10	10		20	10	
			TOTAL	**200**	

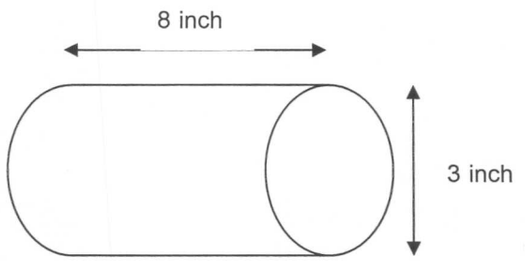
Good Luck **Thanate Ratanawilai**

Name ..... **Student ID** .....

Student ID .....

1. (20 points) Figure below shows a 3-inch diameter low carbon-steel shaft. The length of cut is 8 in. If the feed is 0.012 in./rev, calculate;

   Hint: Cutting speed can be found in the book.



   a. The rev/min rate.

   b. The time to machine the length with a high-speed-steel tool bit.

2. (10 points) Describe the following types of milling operations:
   a. Profile milling .....

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   b. Face milling .....

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3. (10 points)
   a. What is climb milling?

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   b. What is conventional milling?

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4. (10 points)
   a. What are machine axes?

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   .....

   b. Spindle movement is primarily along the ..... Axis.
   c. Table movements for most milling machines are along the ..... and ..... axes.

5. (10 points) Identify the two types of control systems used to output tool movement. What is the difference between them?

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6. (10 points) What advantage does a pallet loading mechanism offer to a machining center?

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7. (10 points) What is interpolation? How is it used to cut curves?

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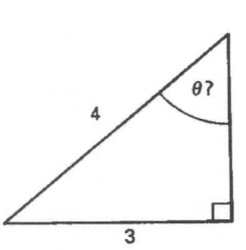
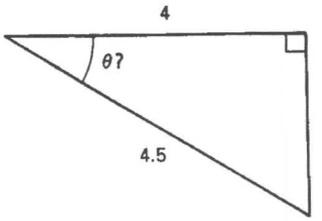
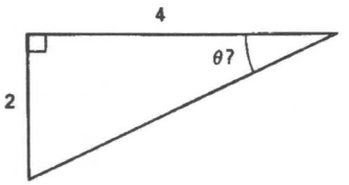
8. (6 points) Determine the unknown angle for each triangle shown in figure below. Explain



(a)



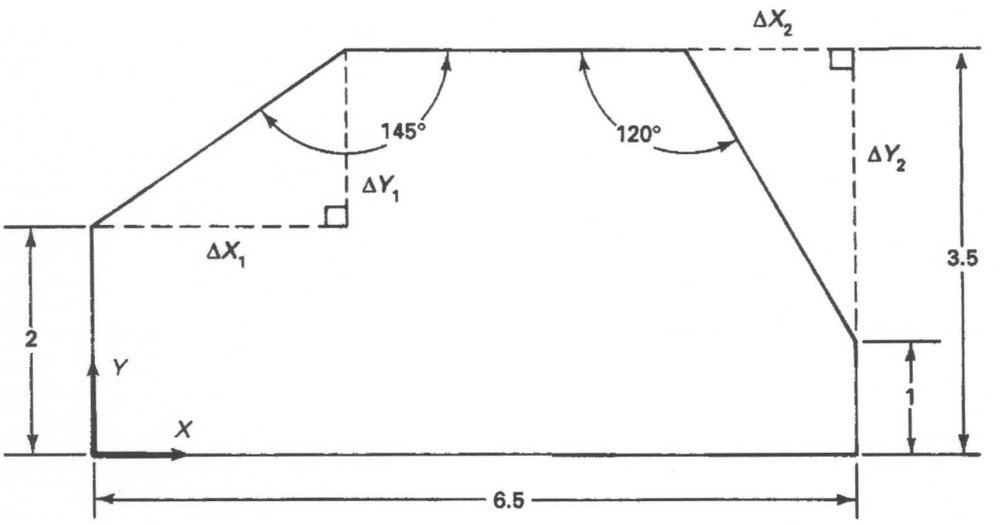
(b)



(c)

a. θ = ... b. θ = ... c. θ = ...

9. (8 points) Find the distance ΔX and ΔY in the part shown in figure below. Explain



ΔX_1 ..... ΔY_1 .....

ΔX_2 ..... ΔY_2 .....

10. (10 points)

a. What is the tool length offset?

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b. How is the tool length offset measured?

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11. (10 points) What is the difference between modal and nonmodal G codes?

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12. (10 points) Match the terms on the left with the definitions on the right:

____ Character	(a) A letter describing the meaning of a number following the letter
____ Address	(b) A sequence of blocks
____ Word	(c) Alphanumeric or punctuation mark
____ Block	(d) An address followed by a number
____ Program	(e) A complete command to the CNC machine

13. (4 points) Give four reasons for using cutting fluids in CNC operations.

(1).....

(2).....

(3).....

(4).....

14. (10 points) Explain the effect of each block on the CNC machine.

    a. N0010 G01X1.5F5.0

    .....

    .....

    b. N0100 G00X2Y0S500

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    .....

    c. N0050 T04M06

    .....

    .....

    d. N0020 G92X-2.Y5.

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    .....

    e. N0070 G90G20

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    .....

15. (6 points) Explain each types of chip produced during metal cutting.

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16. (20 points) Given a cutting speed of 80 ft/min, a feed of 0.020 in./rev, and a drill diameter of ¾ in. The material to be cut is medium steel. Calculate the horsepower requirements if the efficiency is 65%.

17. (10 points) Explain the features of different kinds of tool wear.

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18. (10 points) Explain temperature distributions in metal cutting where the heat was generated and transferred to. Draw figure to demonstrate your answer and identify the area of highest temperature.

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19. (6 points) Explain the difference between tool speed and tool feed as regards to lathe operations.

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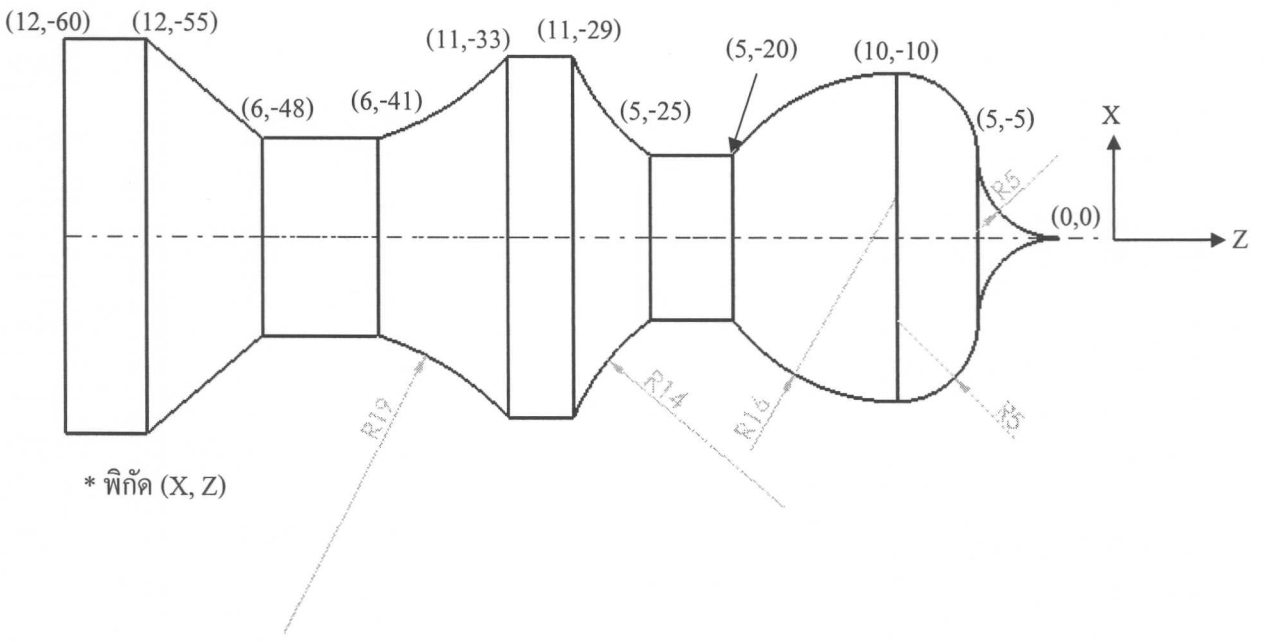
20. (10 points) Complete a CNC program (on page 11) to turning profile given in the figure below. Set Xo Zo at the right end of the part.



* พิกัด (X, Z)

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Block No.	NC Code
N001	:G90 G71 G63 G95 G97 G40
N002	T1 M6.1
N003	S1500 ____
N004	G0 X13 Z5
N005	____ [START P1]-[END P1] D1 E0.5 I0.5 K0.5U0.25 W0.25 Q2 F0.2 M8
N006	G0 X13 Z5
N007	____ [START P1]-[END P1] F0.05
N008	G0 X13 Z5
N009	M30
N010	[____ P1]
N011	G1 X0 Z0
N012	G2 X5 Z-5____
N013	G3 X10 Z-10 P5
N014	G3 X5 Z-20 ____
N015	G1 X5 Z-25
N016	G2 X11 Z-29 P14
N017	G1 _____
N018	G2 X6 Z-41 ____
N019	G1 X6 Z-48
N020	G1 _____
N021	G1 X12 Z-60
N022	G0 X13
N023	[____ P1]