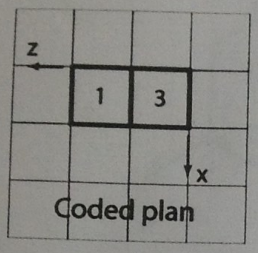
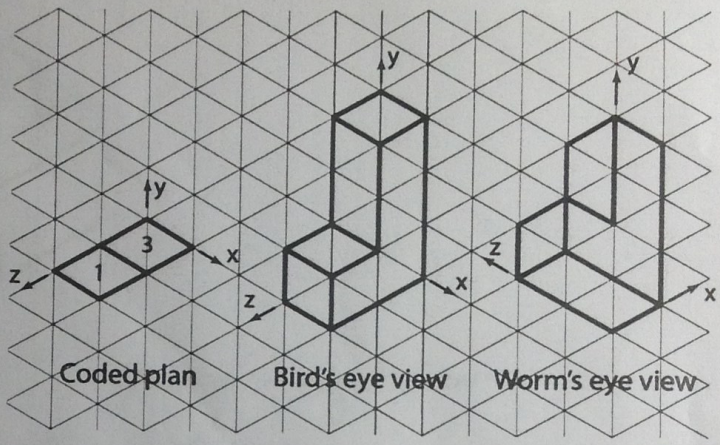
E28 Midterm Exam #1, Fall Semester 2012

Problem #1 50 points

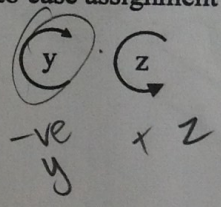
In class, we created isometric objects from coded plans using a "bird's eye view", i.e. looking at the object from the top down. A "worm's eye view" is created by looking at the same object from the bottom up. The difference is shown in the figure below.

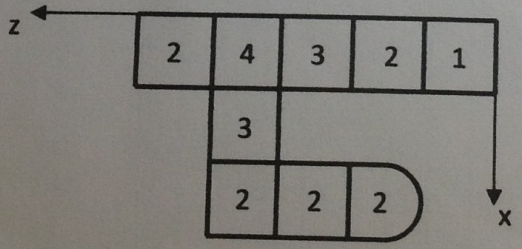




a. For the coded plan show below, sketch an isometric view of the structure as seen from the worm's eye view, using the coordinate system given

b. Starting with the isometric worm's eye view view of the object (created in part a of this problem), redraw the object after the following rotations. Be sure to redraw the object after each rotation, to ease assignment of partial credit. Draw and label the coordinate axes.





For all sketches on this exam, shading of surfaces is recommended, but not required.

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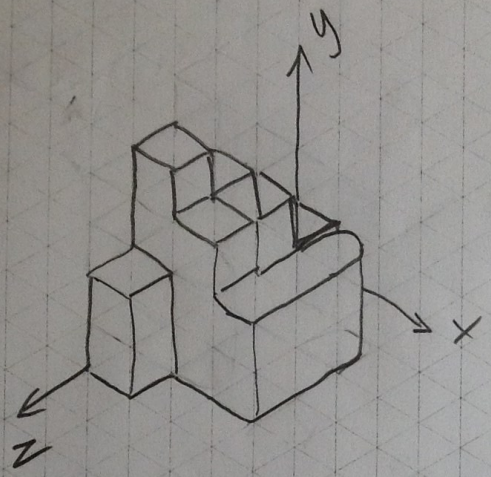
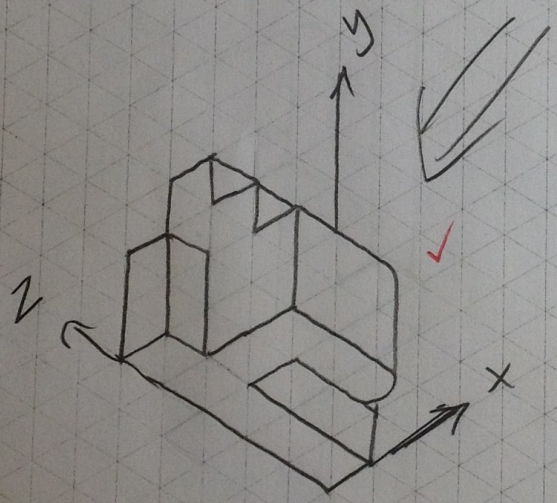
(a)



Worm's eye view.



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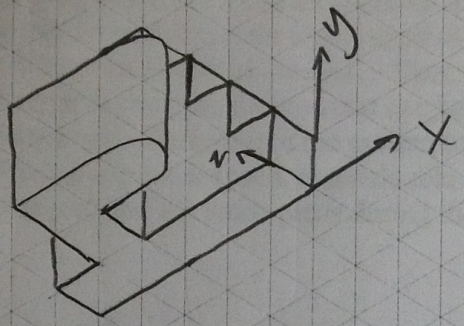
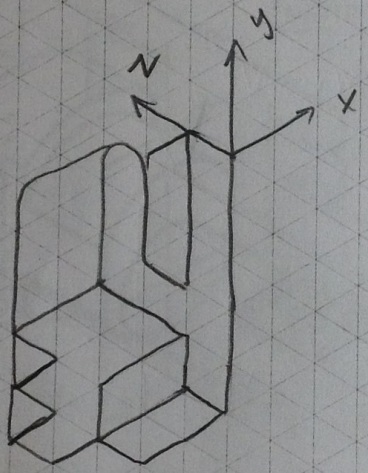
(b)



after Cy −ve y



after Cz +ve z

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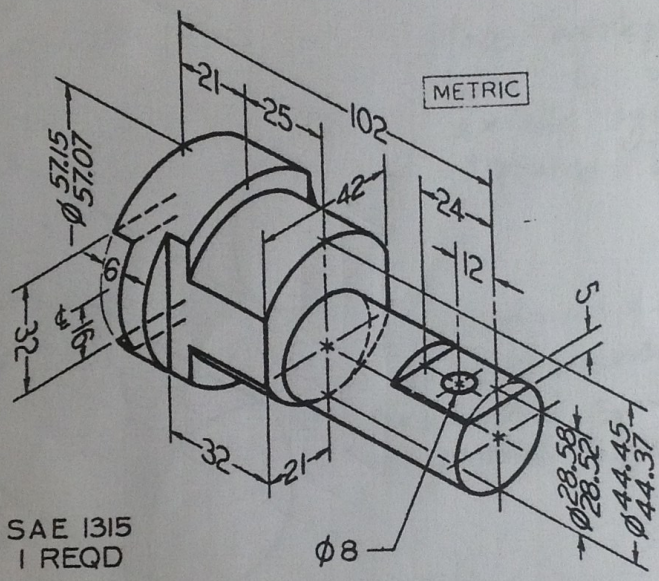
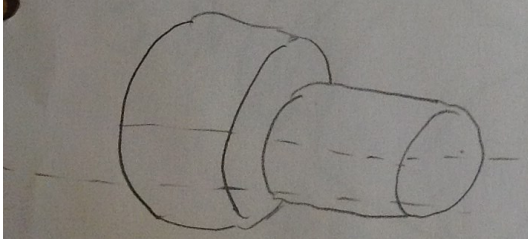
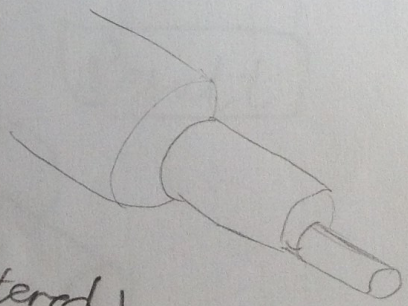
Problem #2 30 points 28

The object shown below is a roller stud. It is made of AISI 304 stainless steel. Note that different axially symmetric features on the part do not share the same centerline. The allowable dimensional error on all geometry is 0.100 mm, except for surfaces indicated. Specify practical fabrication steps that can be used to create a prototype of the object by sketching pictorial diagrams of the part after each feature is created. Start with a standard stock material geometry. Specify the best prototype fabrication process that can be used to create each feature. For each process, sketch the shape and orientation of the cutting tool to be used. Use arrows (with a single arrowhead for relatively slow speed, and a double arrowhead for relatively fast speed) to show the motion of the tool and the work-piece during the fabrication process.



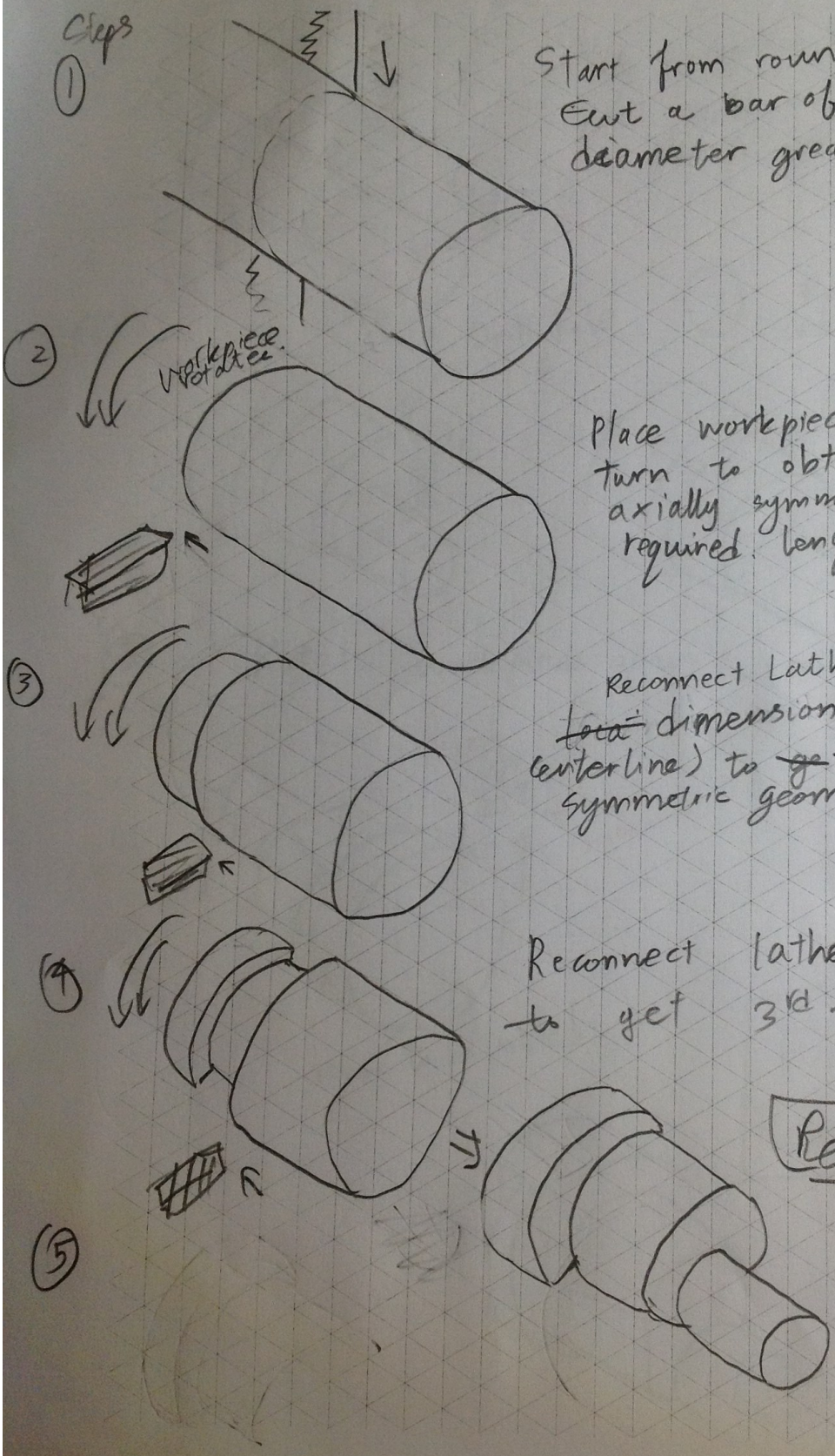


Turning Mount #1
(Place on lathe, off-centered)



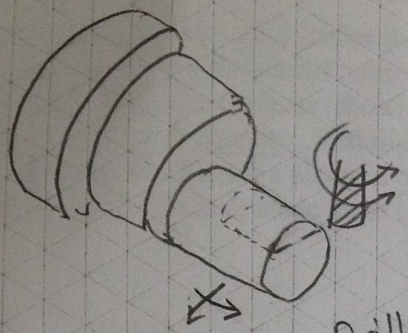
For all sketches on this exam, shading of surfaces is recommended, but not required.

Steps

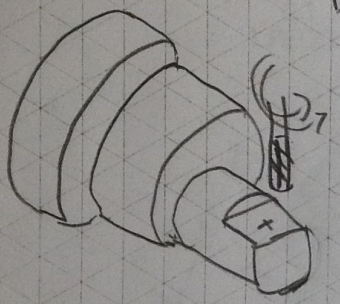


For all sketches on this exam, shading of surfaces is recommended, but not required.

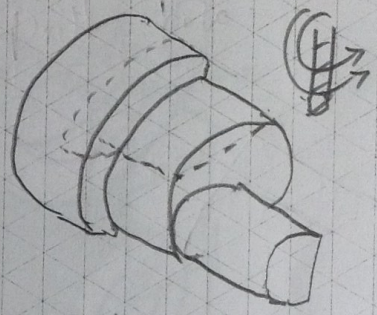
(5) Place workpiece on milling machine & mill out slot.



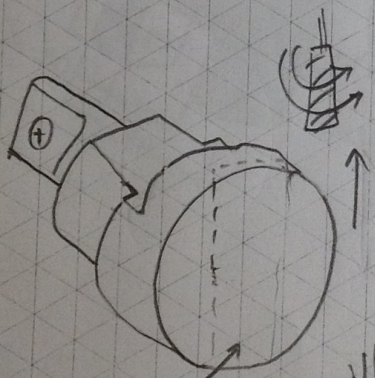
(6) Drill hole.



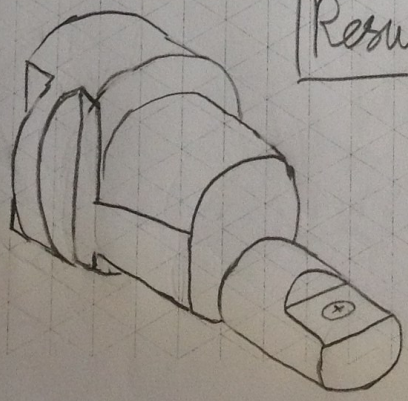
(7) Rotate workpiece and mill out the T-shaped slot.



(8) Rotate workpiece again & mill out slot behind.



Final Result



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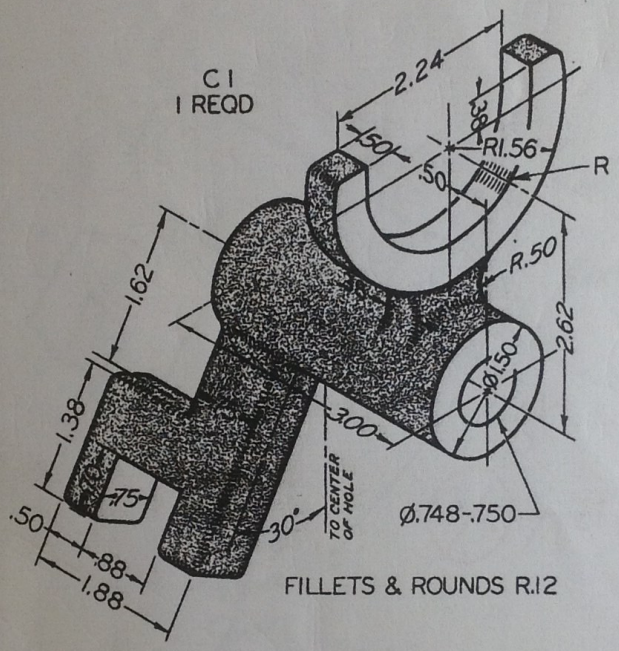
Think of easier mtl to make (other than in.

Problem #3 20 points

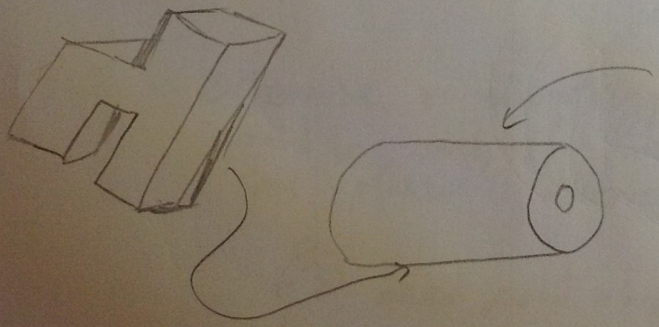
The object shown below is a steel shifter fork. When this part is finally manufactured, it will be investment-cast to achieve its overall basic shape (shown as shaded), and then post-machined to create the needed precision surfaces (shown as non-shaded). It is desired to make one prototype of the part, to test its functionality. Redesign the part so it will be faster and less costly to produce as a prototype. Sketch a pictorial of the prototype. Clearly indicate the changes you have made, and why you have made these changes.

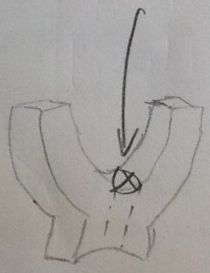


Ans

screws or

Brazing/ Welding.





Okay, if you say screws, need to show where the screw goes. (not the best ans, but in this test, its accepted.

For all sketches on this exam, shading of surfaces is recommended, but not required.

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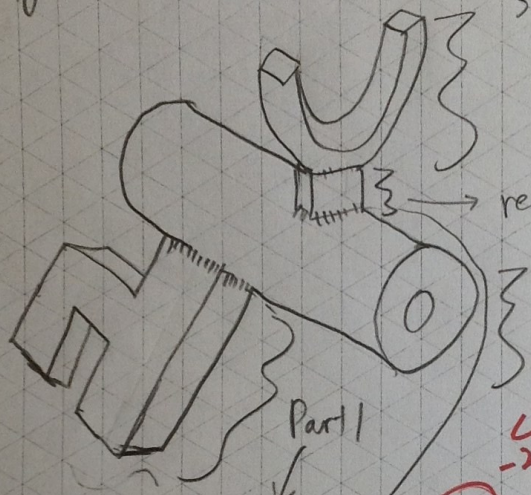
15

If just 1 prototype is to be made of steel, then it could be made as ~~4~~ seperate parts from stock material & then welded / brazed together.

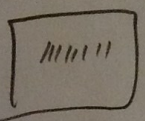
Part 4 sawed from round stock & cut into half & machined.



Could have sharp edges corners

-2

3/5 pictorial



regions of welding

2

Part ① & ③ could just have sharp edges from stock material. (no need for machining).

Otherwise, rapid-prototyping methods like 3-D printing could be used, if material does not need to be steel but plastic is allowed.

-3 need post machining after welding to fix deformations

For all sketches on this exam, shading of surfaces is recommended, but not required.