MEEG 4103 Quiz 4.1.091

1. ⑩ Describe the ten **guiding rules** in the *method of conjugate beam*.

Rule 1: The conjugate beam and the actual beam are of the **same length**.

Rule 2: The **loading** on the conjugate beam is simply the distributed **elastic weight**, which is given by the bending moment *M* in the actual beam divided by the flexural rigidity *EI* of the actual beam. (The *elastic weight*, *M/EI*, points upward if the *bending moment* is positive — to cause the top fiber in compression — in beam convention.)

	Existing support condition of the **actual beam**	Corresponding support condition for the **conjugate beam**
Rule 3:	Fixed end	Free end
Rule 4:	Free end	Fixed end
Rule 5:	Simple support at the end	Simple support at the end
Rule 6:	Simple support *not* at the end	*Unsupported* hinge
Rule 7:	*Unsupported* hinge	Simple support

Rule 8: The conjugate beam (hence its free body) is in static **equilibrium**.

Rule 9: The **slope** of (the centerline of) the actual beam at any cross section is given by the "**shearing force**" at that cross section of the conjugate beam. (This **slope** is positive, or counterclockwise, if the "**shearing force**" is positive — tending to rotate the beam element clockwise — in beam convention.)

Rule 10: The **deflection** of (the centerline of) the actual beam at any point is given by the "**bending moment**" at that point of the conjugate beam. (This **deflection** is upward if the "**bending moment**" is positive — tending to cause the top fiber in compression — in beam convention.)