**Practice Problem Set 1: Engineering Mechanics (NMEC101)**
**Answers**

**1. (a)** $M$ = 115.23 N-cm and $\alpha$ = 39.3$^o$
**(b)** Equivalent force = 56.1 N

**2. (a)** $\vec{R} = (-27.5\hat{\imath} + 11.65\hat{\jmath})$ N
**(b)** The line of action of the resultant ($\vec{R}$) intersects line AB at 1.7 cm right from end A.
The line of action of the resultant ($\vec{R}$) intersects line BC 3.63 cm above end C.

**3.** The line of action of the resultant intersects the bottom edge of the bracket at 27.4 mm to the right of end F.

**4. (a)** $\vec{R} = (4.15\hat{\imath} + 6.07\hat{\jmath})$ N
**(b)** The line of action of the resultant ($\vec{R}$) intersects a line drawn through point B and C at 477 mm to the left of B.
**(c)** The line of action of the resultant ($\vec{R}$) intersects a line drawn through point A and A at 409 mm from B along AB.

**5. (a)** $\vec{R} = 2P\hat{\imath}$ , Magnitude = 2$P$
**(b)** Pitch of the wrench system = 0.75$a$
**(c)** The axis of the wrench intersects the $yz$ plane at $y$ = 3$a$ and $z$ = 2.5$a$

**6. (a)** $\vec{R} = -P\hat{k}$ , Magnitude = $P$
**(b)** Pitch of the wrench system = 3$a$
**(c)** The axis of the wrench intersects the $xy$ plane at $x$ = 0 and $y$ = $a$

**7. (a)** $\vec{R} = -50\hat{\jmath}$ , Magnitude = 50 N
**(b)** Pitch of the wrench system = 2 mm
**(c)** The axis of the wrench intersects the $xz$ plane at $x$ = 4 mm and $z$ = 0.

**8. (a)** $\vec{R} = \left(-24\hat{\imath} - 45\hat{\jmath} - 79.2\hat{k}\right)$ N, Magnitude = 94.2 N
**(b)** Pitch of the wrench system = 5.71 cm
**(c)** The axis of the wrench intersects the $xz$ plane at $x$ = 4.62 cm and $z$ = 30.78 cm.