Problem information: Mean = 85.7, standard deviation = 2.5 and raw score = 89.

Question 1: Find z-score

$$z = \frac{\text{raw score - mean}}{\text{standrad deviation}} = \frac{X - M}{SD} = \frac{89 - 85.7}{2.5} = \frac{3.3}{2.5} = 1.32$$

z = 1.32

Question 2: Find the raw score (assume you did not do calculation above) for above problem if *z* score is 1.32.

$$z = \frac{X - M}{SD} \text{ or } 1.32 = \frac{X - 85.7}{2.5}$$

$$1.32(2.5) = X - 85.7$$

$$3.3 = X - 85.7$$

$$\text{So } X = 3.3 + 85.7 = 89$$

Raw score or X = 89

Question 3: Find the raw score for above problem if *z* score is -1.48.

$$z = \frac{X - M}{SD} \text{ or } -1.48 = \frac{X - 85.7}{2.5}$$

$$-1.48(2.5) = X - 85.7$$

$$-3.7 = X - 85.7$$

$$\text{So } X = -3.7 + 85.7 \text{ or } X = 85.7 - 3.7 = 82$$

Raw score or X = 82

Question 4: Find the *T* score for above problem when *z* = -1.48.

For *T* score, $\sigma = 10$ and μ=50

Formula for converting *z* scores to *T* scores is: $T = \sigma z + \mu$

So $T = 10(-1.48) + 50 = -14.8 + 50$ or $T = 50 - 14.8 = 35.2$

So ***T = 35.2***

Question 5: Find the raw score for problem above if *T* score is 65.

For *T* score, $\sigma = 10$ and μ=50

Formula for converting *z* scores to *T* scores is: $T = \sigma z + \mu$

Strategy: First use $T = \sigma z + \mu$ to find z-score from T score, and then use z-score formula to find raw score, X.

Step 1: Find z-score

Since $T = \sigma z + \mu$, then $65 = 10z + 50,$ so $65 - 50 = 10z$ or $10z = 15$

$$z = \frac{15}{10} = 1.5$$

Step 2: Use z = 1.5 and *M* = 85.7 and *SD* = 2.5 from orginial problem information to find raw score, *X*

$$z = \frac{X - M}{SD} \text{ or } 1.5 = \frac{X - 85.7}{2.5}$$

$1.5(2.5) = X - 85.7$ or 3.75+85.7 = X

So raw score , X = 89.45 or 89.5