Problem Statement 1

Insufficient information

Problem Statement 2

(a) $(i) P(Z > 1.26) = 1 - P(Z \leq 1.26) = 1 - 0.8962 = \mathbf{0.1038}$

$$(ii)\ P(Z < -0.86) = \mathbf{0.1949}$$

$$(iii)\ P(Z > -1.37) = 1 - P(Z < -1.37) = 1 - 0.0853 = \mathbf{0.9147}$$

$$(iv)\ P(-1.25 < Z < 0.37) = \varphi(0.37) + \varphi(1.25) - 1 = \mathbf{0.5387}$$

$$(v) P(Z \leq -4.6) = \varphi(-4.6) = \mathbf{0.00000211}$$

(b) $P(Z > z) = 0.05$

$$P(Z > z) = 0.05$$
$$1 - P(Z \leq z) = 0.05$$
$$P(Z \leq z) = 0.95$$
$$\varphi(z) = 0.95$$
$$z = \varphi^{-1}(0.95)$$
$$= \mathbf{1.645}$$

(c) $P(-z < Z < z) = 0.99$

$$P(-z < Z < z) = 0.99$$

$$\varphi(z) - \varphi(-z) = 0.99$$
$$2\varphi(z) - 1 = 0.99$$
$$\varphi(z) = \frac{1.99}{2}$$
$$z = \varphi^{-1}(0.995)$$
$$= \mathbf{2.576}$$

Problem Statement 3

Solution 3: Let X be the random variable that represents the current flow in a copper wire $X \sim N(10, 4)$

a) $P(X > 13) = P\left(\frac{X-\mu}{\sigma} > \frac{13-10}{2}\right) = P\left(Z > \frac{3}{2}\right)$

$$= 1 - P(Z \leq 1.5) = 1 - \mathbf{0.9332}$$

$$= \mathbf{0.0668}$$

b) $P(9 < X < 11) = P\left(\frac{9-10}{2} < \frac{X-\mu}{\sigma} < \frac{11-10}{2}\right) = P(-0.5 < Z < 0.5)$

$$= 2\varphi(0.5) - 1 = 2(0.6915) - 1$$
$$= \mathbf{0.3829}$$

c) $P(X < x) = 0.98$

$$P(Z < z) = 0.98$$
$$\varphi(z) = 0.98$$
$$z = \varphi^{-1}(0.98)$$
$$= \mathbf{2.054}$$