(1) Find the principle value of the logarithm $\mathrm{Ln}(6-6i)$ in the form $a+ib$
(a) $\frac{1}{2}\log_e 72 - \frac{1}{4}\pi i$
(b) $\frac{1}{2}\log_e 72 + \frac{1}{4}\pi i$
(c) -$\frac{1}{2}\log_e 72 - \frac{1}{4}\pi i$
(d) -$\frac{1}{2}\log_e 72 + \frac{1}{4}\pi i$

(2) Given $x_1 = 1$, $x_{n+1} = \sqrt{x_n + 2}$, $n \in \mathbb{N}$. Then
(a) (x_n) is bounded and divergent
(b) (x_n) is increasing and convergent
(c) (x_n) is decreasing and convergent
(d) (x_n) is unbounded and divergent

(3) Let $f : (\mathbb{R}, \tau_u) \to (\mathbb{R}, \tau_u)$ be a continuous function such that $f(\mathbb{R}) \subseteq \mathbb{N}$, where τ_u is the usual topology on $\mathbb{R}$. Then which of the following statements is correct?
(a) f is constant.
(b) f need not be constant.
(c) $f(\mathbb{R}) = \mathbb{N}$.
(d) None of these.

(4) The rate of convergence of the Newton-Raphson method, while finding the real root of the equation $x^2 = 1 + 2\ln x$ will be
(a) Linear.
(b) Quadratic.
(c) Cubic.
(d) Method does not converge.

(5) The geodesics on the right circular cylinder $r = 1$ are given by the extremals of the functional:
(a) $L[z(\theta)] = \displaystyle\int_{\theta_1}^{\theta_2} \sqrt{1 + (z')^2}\, d\theta.$
(b) $L[z(\theta)] = \displaystyle\int_{\theta_1}^{\theta_2} \sqrt{z^2 + (z')^2}\, d\theta.$
(c) $L[z(\theta)] = \displaystyle\int_{\theta_1}^{\theta_2} z\sqrt{1 + (z')^2}\, d\theta.$
(d) None of these.