

Use calculus to find the critical points in each problem. Determine if the critical points are local maximums or minimums.

1. $E(\theta) = \frac{(\theta - \mu\theta^2)}{\mu + \theta}$ Assume μ is a positive constant and $\theta > 0$.

2. $E(x) = \frac{kx}{(x^2 + r_0^2)^{3/2}}$ Assume k is a positive constant.

3. $\theta(D) = \arctan\left(\frac{2\alpha}{D}\right) - \arctan\left(\frac{\alpha}{D}\right)$. Assume α is a positive constant and $D > 0$.

4. $S = \frac{7k}{x^2} + \frac{k}{(20-x)^2}$. Assume k is a positive constant and $0 \leq x \leq 20$.