

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  $\mu$  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  $\alpha$  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  $0 \leq x \leq 20$ .