1. Find a set of parametric equations for the line segment that joins point $A(1, 3)$ to point $B(4, 7)$.
Moreover, we require that point $A$ corresponds to parameter $t = 0$, and $B$ corresponds to parameter $t = 1$

$$x = 3t + 1, \ y = 4t + 3 \text{ where } 0 \leq t \leq 1$$

2. The following two points $A(2, 4)$ and $B(-1, 1)$ lie in the parabola $y = x^2$.
Determine the length of the curved segment along the graph of $y = x^2$ between $A$ and $B$.

$$\frac{1}{4} \left( 2\sqrt{5} + 4\sqrt{17} + \log (2 + \sqrt{5}) + \log (4 + \sqrt{17}) \right)$$

3. Evaluate the integral.

(a) $\int_1^2 \sqrt{4 - x^2} \, dx$

(b) $\int_0^1 \frac{1}{\sqrt{4 - x^2}} \, dx$

4. Determine if the series is absolutely convergent, conditionally convergent, or divergent.

(a) $\sum_{n=1}^{\infty} \frac{n}{n^2 + 1}$

(b) $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^2}$

(c) $\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n}}$