1. The weekly demand for propane gas (in 1000s of gallons) from a particular facility is a continuous RV $X$ with pdf:

$$f(x) = \begin{cases} 
2 \left(1 - \frac{1}{x^2}\right) & 1 \leq x \leq 2 \\
0 & \text{otherwise}
\end{cases}$$

A. Obtain the cdf of $X$.

B. What is the probability that demand is 1.8 (thousand) gallons or less?

C. What is the probability that demand is between 1.2 and 1.6 (thousand) gallons?

D. Compute $E(X)$.

E. Compute $V(X)$.

2. Suppose droplet size for water sprayed through a certain type of nozzle is normally distributed with mean 1050 µm and standard deviation 150 µm. Give your answers to four decimal places.

A. What is the probability that the size of a single droplet is less than 1500 µm?
B. What is the probability that the size of a single droplet is more than 1000 µm?

C. What is the probability that the size of a single droplet is between 1000 and 1500 µm?

D. Find the 65th percentile of droplet size.

E. Find the droplet size such that 98% of droplets are larger than this value.

3. There are two machines available for cutting corks for wine bottles. Machine 1 produces corks with diameters that are normally distributed with mean 3 cm and standard deviation 0.1 cm. The second machine produces corks with diameters that are normally distributed with mean 3.04 cm and standard deviation 0.02 cm. Acceptable corks have diameters between 2.9 cm and 3.1 cm. Give your answers to four decimal places.

   A. What proportion of corks produced by Machine 1 are acceptable?

   B. What proportion of corks produced by Machine 2 are acceptable?