Question 1

QUESTION 3

Simple Familiar
Technology Free
2020

According to a recent census, the mean hours worked per week by all Australian workers is 35.6 hours.

A mean of 36.1 hours worked per week is calculated from a random selection of 500 Australian workers.

Based on this data, which of the following is correct?

(A) $\bar{x} = 35.6, \mu = 36.1$

(B) $\bar{x} = 35.6, \bar{X} = 36.1$

(C) $\bar{x} = 36.1, \mu = 35.6$

(D) $\bar{x} = 36.1, \bar{X} = 35.6$

Question 2

QUESTION 4

Simple Familiar
Technology Free
2021

The number of sunflower seeds in each packet produced by a company is known to be normally distributed with a standard deviation of 100. A worker counts the number of seeds in a random sample of four packets and calculates the sample mean.

Based on this sampling, the standard deviation of the distribution of the sample mean is

(A) 25

(B) 50

(C) 75

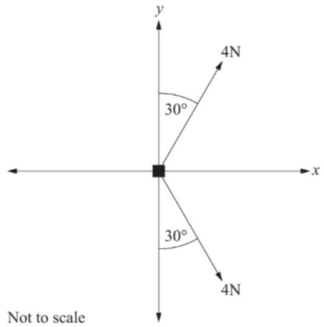
(D) 100

Question 3

QUESTION 7

Simple Familiar
Technology Free
2022

Two forces act concurrently on a 2 kg object placed at the origin.



Not to scale

The magnitude of the acceleration of the object is

(A) $2\ \text{m s}^{-2}$

(B) $2\sqrt{3}\ \text{m s}^{-2}$

(C) $4\ \text{m s}^{-2}$

(D) $4\sqrt{3}\ \text{m s}^{-2}$

Question 4

QUESTION 13 (4 marks)

Simple Familiar
Technology Free
2020

The expected value of an exponential random variable X with parameter $\lambda > 0$ can be determined using the rule

$$E(X) = \int_0^\infty x\lambda e^{-\lambda x}\,dx$$

Use integration by parts to determine $E(X)$.

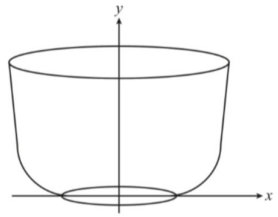
Express your answer in simplest form.

Question 5

QUESTION 19 (7 marks)

Complex Unfamiliar
Technology Free
2020

A circular-based bowl has been positioned symmetrically on a Cartesian plane as shown in the diagram.



The bowl has a shape that can be generated by rotating the curve $y = \frac{4}{8-x} - 1$ about the y-axis for $4 \le x \le 7.6$ cm.

The bowl is being filled with a liquid at the rate of $7\pi\ \text{cm}^3\,\text{s}^{-1}$.

Determine the rate at which the depth of liquid is increasing when the depth of liquid reaches one-third of the height of the bowl.