Question 1

QUESTION 2

Simple Familiar
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2023

Consider the proof of the following proposition using mathematical induction.

$$\sum_{r=1}^{n} r(r+1) = \frac{1}{3}n(n+1)(n+2) \ \forall n \in Z^+$$

An appropriate assumption statement within the proof is

(A) $\sum_{r=1}^{k} k(k+1) = \frac{1}{3}k(k+1)(k+2)$

(B) $\sum_{r=1}^{k} k(k+1) = \frac{1}{3}n(n+1)(n+2)$

(C) $\sum_{r=1}^{k} r(r+1) = \frac{1}{3}k(k+1)(k+2)$

(D) $\sum_{r=1}^{k} r(r+1) = \frac{1}{3}n(n+1)(n+2)$

Question 2

QUESTION 3

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One solution of $z^3 - z^2 - 7z - 2 = 0$ is $z = -2$.

Which equation could be used to determine the remaining solutions?

(A) $z^2 - 3z - 1 = 0$

(B) $z^2 - 3z + 1 = 0$

(C) $z^2 - z - 1 = 0$

(D) $z^2 - z + 1 = 0$

Question 4

QUESTION 15 (4 marks)

Simple Familiar
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2021

Use partial fractions to determine $\int \frac{4x-17}{x^2-x-6}\,dx$, where $x \in R, x \neq -2, x \neq 3$.

Express your answer in the form $\ln|f(x)| + c$.

Question 5

QUESTION 17 (7 marks)

Complex Familiar
Technology Free
2020

Determine the smallest positive value of a given

$$\int_{-a}^{a} 1 + \left(\frac{\sec(2x)+\tan(2x)}{\operatorname{cosec}(2x)+1}\right)^2 dx = 1$$