Question 1

QUESTION 1

Simple Familiar
Technology Free
2020

The indefinite integral $\int \frac{3x-A}{1-x^2}\,dx$ can be determined using the partial fractions $\frac{-1}{1+x}+\frac{2}{1-x}$

The value of A is

(A) -3

(B) -1

(C) 1

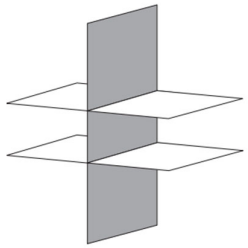
(D) 3

Question 2

QUESTION 9

Simple Familiar
Technology Free
2023

The geometric interpretation of a certain system of three equations with no solution is shown.



Given two of the equations are $x+y-z=0.5$ and $x-y-z=0.5$, the third equation could be

(A) $2x-2y-2z=1$

(B) $2x+2y-2z=1$

(C) $2x-2y+2z=3$

(D) $2x+2y-2z=3$

Question 3

QUESTION 11 (5 marks)

Simple Familiar
Technology Free
2021

Let $f(x)=\tan^{-1}\left(\frac{x}{2}\right)$ for suitable values of x where $f(x)\in\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$.

a) Determine $f(2)$. *[1 mark]*

b) Determine $f'(2)$. *[2 marks]*

c) Use the results from Questions 11a) and 11b) to determine the equation of the tangent to the graph of $y=f(x)$ at $x=2$. *[2 marks]*

Question 4

QUESTION 11 (6 marks)

Simple Familiar
Technology Free
2022

The position vector of a particle, $\boldsymbol{r}_1(\text{cm})$, over time, $t(\text{s})$, is given by

$$\boldsymbol{r}_1(t)=(2t+1)\hat{\boldsymbol{i}}+(t+3)\hat{\boldsymbol{j}}-(2t-3)\hat{\boldsymbol{k}}$$

a) Determine the velocity vector of the particle. *[1 mark]*

b) Determine the time when the position vector of the particle is perpendicular to its velocity vector. *[2 marks]*

The position vector of a second particle, $\boldsymbol{r}_2(\text{cm})$, over time, $t(\text{s})$, is given by

$$\boldsymbol{r}_2(t)=(16-4t)\hat{\boldsymbol{i}}-(3t-13)\hat{\boldsymbol{j}}+2\hat{\boldsymbol{k}}$$

c) Determine whether the two particles collide. *[3 marks]*