

NHT June 2018 Exam 2 Suggested Solutions

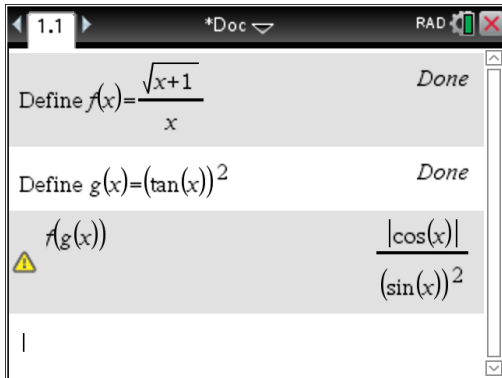
Section A MC

Question 1

$$3\operatorname{cosec}(x) \rightarrow 3\operatorname{cosec}(x-1) \rightarrow 3\operatorname{cosec}(2(x-1))$$

Answer: C

Question 2



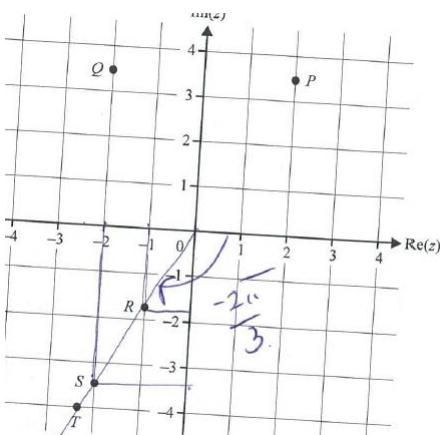
Answer: D

Question 3

$$\text{domain} \left(\frac{3 \cdot x}{\frac{\pi}{2} - \cos^{-1}(2-x)}, x \right) \quad x \neq 2 \text{ and } 1 \leq x \leq 3$$

Answer: E

Question 4



Answer: D

Question 5

$$\begin{aligned} z &:= x + y \cdot i && x + y \cdot i \\ (z+2) \cdot (\text{conj}(z)+2) &= 4 && x^2 + 4 \cdot x + y^2 + 4 = 4 \\ \text{completeSquare}(x^2 + 4 \cdot x + y^2 + 4 = 4, x, y) &&& \\ &&& (x+2)^2 + y^2 = 4 \end{aligned}$$

Answer: B

Question 6

$$\text{cZeros}(z^3 + 2 \cdot z^2 + 9 \cdot z + 18, z) \quad \{3 \cdot i, -3 \cdot i, -2\}$$

Real coefficients, two complex roots in conjugate pairs, one real root.

Answer: D

Question 7

The screenshot shows a CAS window titled '*Solutions ...018' in RAD mode. The input is $\text{impDif}(3 \cdot y^2 - 5 \cdot x \cdot y - x^2 = 1, x, y)$. The output is $\frac{-(2 \cdot x + 5 \cdot y)}{5 \cdot x - 6 \cdot y}$. Below this, a warning icon is shown next to $\frac{-1}{5 \cdot x - 6 \cdot y}$. At the bottom, the solution is given as $\frac{5 \cdot x - 6 \cdot y}{2 \cdot x + 5 \cdot y} | x=1 \text{ and } y=2$ with a value of $\frac{-7}{12}$.

Answer: D

Question 8

$$u = 4x + 1$$

$$\frac{1}{4} du = dx$$

new limits:

$$x = 1, u = 5$$

$$x = 2, u = 9$$

$$\frac{1}{4} \int_5^9 \frac{3}{2+u^2} du$$

Answer: B

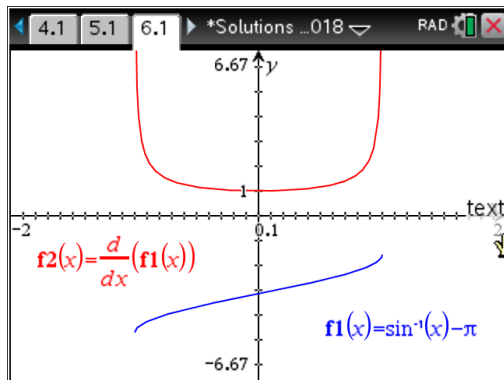
Question 9

$$\cos(10x) = 1 - 2\sin^2(5x)$$

$$1 - 1 + 2\sin^2(5x)$$

Answer: E

Question 10



Answer: E

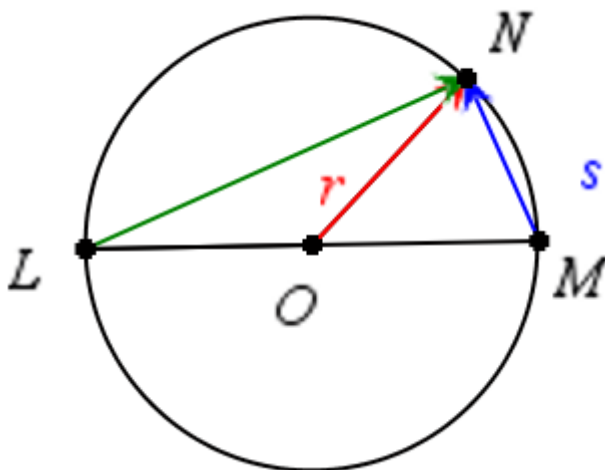
Question 11

Using Notes pages

```
*Vectors TI ... ges DEG
z1:=1 ▶ 1
x2:=2 ▶ 2
y2:=3 ▶ 3
z2:=6 ▶ 6
dotP(a,b) ▶ 4
Angle between vectors a and b.
approx(cos⁻¹( (dotP(a,b) / (norm(a)·norm(b))) )) ▶ 79.0194
```

Answer: C

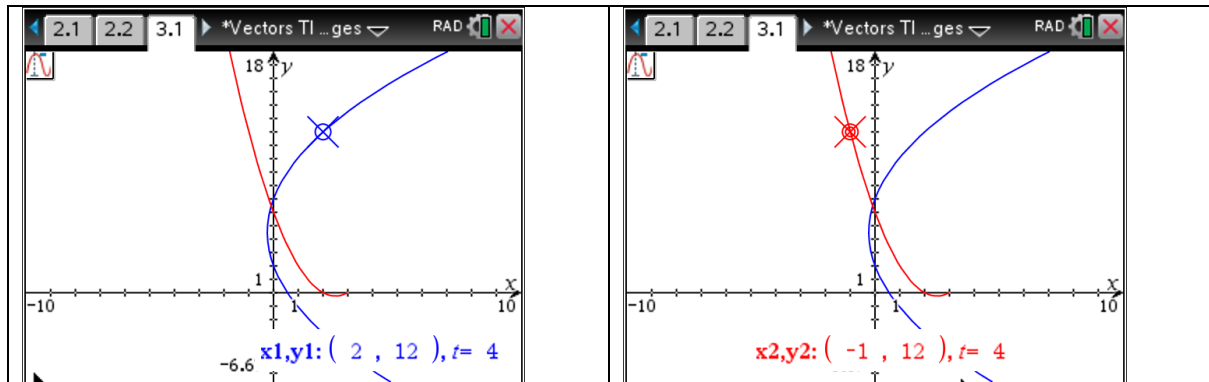
Question 12



$$\begin{aligned}\overrightarrow{OM} &= \underline{r} - \underline{s} \\ \overrightarrow{LN} &= 2\overrightarrow{OM} + \underline{s} \\ &= 2(\underline{r} - \underline{s}) + \underline{s} \\ &= 2\underline{r} - \underline{s}\end{aligned}$$

Answer: E

Question 13



Answer: E

Question 14

Answer: A

Question 15

$$R = 80(9.8 - 1.2)$$

$$R = 688$$

Answer: A

Question 16

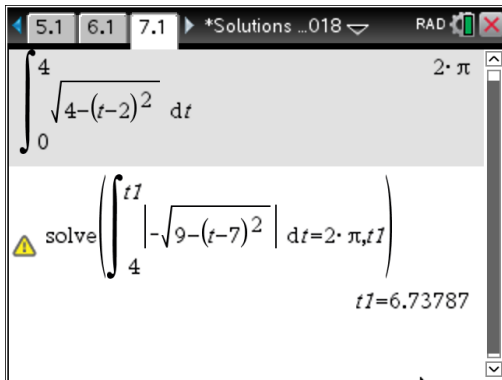
$$a = \frac{20}{t}$$

$$2a = 8$$

$$\frac{2 \times 20}{t} = 8 \Rightarrow t = 5$$

Answer: C

Question 17



Answer: C

Question 18

$$1.2 = 1.96 \times \frac{\sigma}{\sqrt{144}}$$

$$\sigma = 7.35$$

Answer: B

Question 19

$$E(9A) = 1035$$

$$\text{Var}(9A) = 441$$

$$9A \sim N(1035, 21^2)$$

$$\Pr(9A < 1000) = 0.0478$$

Answer: A

Question 20

$$\Pr(O > 3L) = \Pr(O - 3L > 0)$$

$$E(O - 3L) = -10$$

$$\text{Var}(O - 3L) = 25 + 81 = 106$$

$$\Pr(O - 3L > 0) = 0.1657$$

Answer: C

