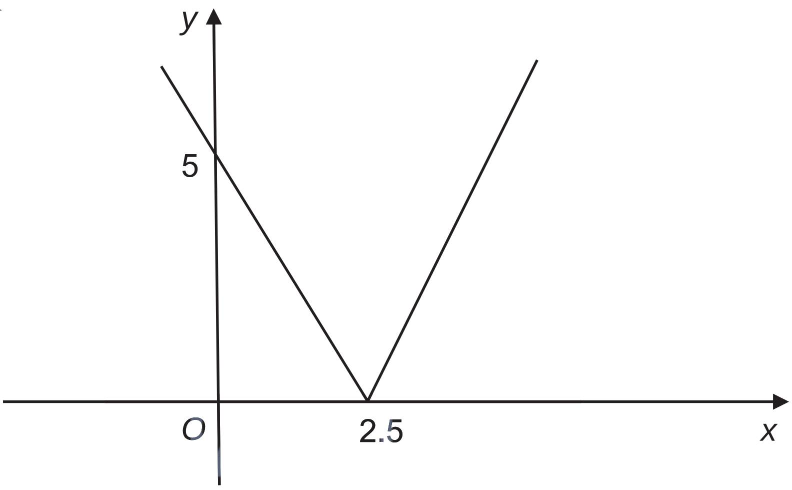
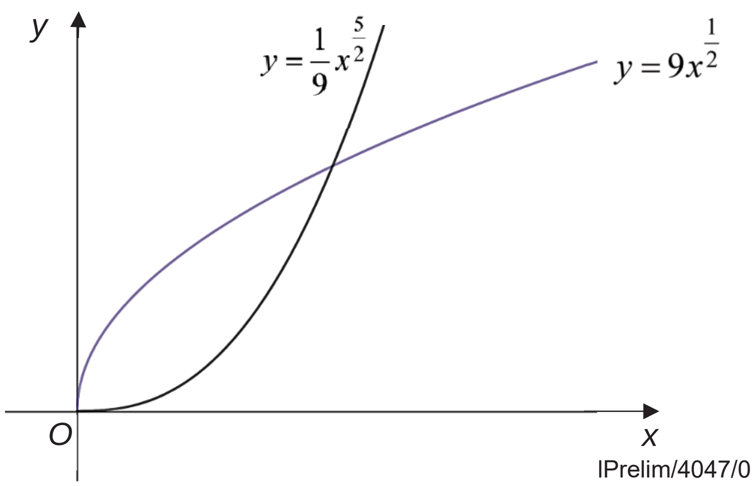
Answers 4E/5N Prelim 2020 AMath Paper 1

No.	Answers	No.	Answers
1	$f'(x)=\dfrac{-19}{(2x-3)^2}$ $\therefore$ Decreasing Function	8i	$p>2$
2	$m=0.0405$	8ii	$b^2-4ac>32$ Since b^2-4ac is always positive for all real values of k, the line will intersect the curve at 2 distinct pts.
3i	$b=(a+2)^2+1$	10i	$a=3 \quad b=6$
3ii	$a\geq 1$ or $a\leq -5$ (reject)	10ii	$g(x)=-8\sin^3 x+6\sin x-5$
4i	$\dfrac{dy}{dx}=\dfrac{3k(x+1)}{\sqrt{2x+3}}$	11i	$t=\dfrac{3\pi}{4}$
4ii	$k=\dfrac{3}{4}$	11ii	$\left(\dfrac{27\pi}{8}-9\right)$ units^2
5i	$P(0, 7)$	12ii	12 seconds
5ii	$2y=-3x+1$	12iii	When $v=0$, $t=7$ or $t=-6$ (reject) Since the particle is at instantaneous rest when $t=7$, the particle changes its direction only once.
6ii	$x=45°,\ 114.3°,\ 155.7°$		
7ii	$x=\dfrac{17}{3}$ or $x=-7$	13ii	$\theta=0.936$ rad
7iii	$m\geq 5$		

7i



9i



Answers to A Math 2020 Prelim P2

1. $k=\dfrac{20}{3}$

2. $x=0.631$

3. (ii) $\dfrac{5x^2-30x+10}{2x^3-13x^2+24x-9}=\dfrac{-3}{5(2x-1)}+\dfrac{14}{5(x-3)}-\dfrac{7}{(x-3)^2}$

   (iii) $\dfrac{-3}{5}\ln(2x-1)+\dfrac{28}{5}\ln(x-3)+\dfrac{14}{(x-3)}+c$

4. (i) $3\ln(3x+1)$ (ii) 5.08

5. (ii) 594 (iii) -4752

6. (ii) $\therefore$ equation is $x^2-\dfrac{9}{2}x+4=0$ or $2x^2-9x+8=0$

7. (ii) $\dfrac{7-3\sqrt{5}}{2}$

8. (a) Radius = 7 units and centre is $(-2,5)$

   (b) (i) Equation of C_2 is $(x-5)^2+(y-4)^2=25$ (ii) Coordinates are $(8,8)$

9. (i) $4\cos 4x-3\sin 4=5\cos(4x+0.644)$ (ii) $5e^{-3x}\cos(4x+0.644)$ (iii) $x=0.232$

10. (i) $f(x)=3x^2-3x^{\frac{3}{2}}-\dfrac{9}{x}+7$ (ii) $2x+21y+40=0$

11. (a) (i) $y=\ln(4x^2-1)+2$

    (b) (ii) $p=5,\ q=8$ (ii) Inaccurate $A=700$

12. (i) when $x=-\dfrac{1}{6}$, $y=\dfrac{2}{\left(2\left(-\dfrac{1}{6}\right)+1\right)}+9\left(-\dfrac{1}{6}\right)-5=-\dfrac{7}{2}$ (ii) coordinates are $\left(-\dfrac{5}{6},-\dfrac{31}{2}\right)$

    (iii)

$$\frac{d^2y}{dx^2}=8(2x+1)^{-3}.2$$
$$=\frac{16}{(2x+1)^3}$$

$\left(-\dfrac{1}{6},-\dfrac{7}{2}\right)$ is a minimum point, $\left(-\dfrac{5}{6},-\dfrac{31}{2}\right)$ is a maximum point.