No.

Date

1. $(3-2x)(1+\frac{x}{2})^n$

$=(3-2x)(1+\binom{n}{1}\times\frac{x}{2})$

$=-2x+\binom{n}{1}\times\frac{3}{2}x$

$-2+\binom{n}{1}\times\frac{3}{2}=7$

$\binom{n}{1}=6$

$n=6$

$(3-2x)(1+3x+\frac{15}{4}x^2)$

$=-6x^2+\frac{45}{4}x^2$

$=\frac{21}{4}x^2$

2.(i) $81\times r^3=24$

$r^3=\frac{8}{27}$

$r=\frac{2}{3}$

(ii) $\frac{81}{1-\frac{2}{3}}=243$

(iii) $81\times\frac{2}{3}=54 \quad 54\times\frac{2}{3}=36$

$54+3d=36$

$d=-6$

$S_{10}=\frac{10[54+54+9\times(-6)]}{2}$

$=270$

Date

3.(i) ~~$\angle BAD =$~~ $\tan\angle BAD = \frac{6}{6}$

~~$\sin\angle BAD =$~~ $\angle BAD = \frac{1}{4}\pi$

$AB = \sqrt{6^2+6^2} = 6\sqrt{2}$

$arc\,BD = 6\sqrt{2} \times \frac{1}{4}\pi = \frac{3}{2}\sqrt{2}\pi \approx 6.66$

(ii) $A_{ABD} = \frac{1}{2} \times (6\sqrt{2})^2 \times \frac{1}{4}\pi$

$= 9\pi$

$A_{\triangle AOB} = 6 \times 6 \div 2 = 18$

$9\pi - 18 = 10.27$

4. ~~AB~~ Let AB is $y = kx + b$

$\begin{cases} 1 = 3k + b \\ 3 = -k + b \end{cases}$

$\begin{cases} k = -\frac{1}{2} \\ b = \frac{5}{2} \end{cases}$

$\therefore BC: y = 2x + c.$

$1 = 6 + c$

$c = -5$

$y = 2x - 5$

Let $OB: y = kx$

$1 = 3k$

$k = \frac{1}{3}$

$\therefore AC: y = \frac{1}{3}x + d$

$3 = -\frac{1}{3} + d$

$d = \frac{10}{3}$

$y = \frac{1}{3}x + \frac{10}{3}$

$\frac{1}{3}x + \frac{10}{3} = 2x - 5$

$x = 5$

$y = 5$

5(i) $\frac{dy}{dx} = -(x-3)^{-2} + 1$

$= -\frac{1}{(x-3)^2} + 1$

$\frac{d^2y}{dx^2} = 2(x-3)^{-3}$

$= \frac{2}{(x-3)^3}$

(ii) $-\frac{1}{(x-3)^2} + 1 = 0.$

$\frac{1}{(x-3)^2} = 1$

$(x-3)^2 = 1$

$x-3 = 1$ or $x-3 = -1$

$x = 4$ or $x = 2$

$\left(\frac{d^2y}{dx^2}\right)_{x=4} = 2$ min

$\left(\frac{d^2y}{dx^2}\right)_{x=2} = -2$ max

$\therefore$ Point A: $(2, 1)$ ~~(4, 5)~~ Point B: $(4, 5)$

No.

Date

6.(i) $\cancel{LHS = \dfrac{\cos\theta}{\frac{\sin\theta}{\cos\theta}(1-\sin\theta)}}$

$\cancel{= \dfrac{\cos\theta}{\frac{\sin\theta(1-\sin\theta)}{\cos\theta}}}$

$\cancel{= \dfrac{\cos^2\theta}{\sin\theta(1-\sin\theta)}}$

$\cancel{= \dfrac{1-\sin^2\theta}{\sin}}$

$LHS = \dfrac{\cos\theta}{\frac{\sin\theta}{\cos\theta} - \frac{\sin^2\theta}{\cos\theta}}$

$= \dfrac{1-\sin^2\theta}{\sin\theta - \sin^2\theta}$

$= \dfrac{(1+\sin\theta)(1-\sin\theta)}{\sin\theta(1-\sin\theta)}$

$= \dfrac{1}{\sin\theta} + 1$

$= 1 + \dfrac{1}{\sin\theta}$

LHS = RHS.

ii $1 + \dfrac{1}{\sin\theta} = 4$

$\sin\theta = \dfrac{1}{3}$

$\theta = 19.47$ or 160.53

7(i) $2y + 3y + y + 3x + 4x + x = 48$

$6y + 8x = 48$

$y = -\dfrac{4}{3}x + 8$

(ii) $3yx + 3xy = 6xy$

$6xy = 6x\left(-\dfrac{4}{3}x + 8\right)$

$= 48x - 8x^2$

$A = 48x - 8x^2$

(iii) $\dfrac{dA}{dx} = 48 - 16x = 0.$ $A = 48\times 3 - 8\times 9 = 72$

$x = 3$

$\dfrac{d^2A}{dx^2} = -16$ $\left(\dfrac{d^2A}{dx^2}\right)_{x=3} = -16$ max

No.

Date

8(i) ~~$f^{-1}: x \mapsto$~~ $y = x^2+1$

$\sqrt{y-1} = x$

$\therefore$ $f^{-1}: x \mapsto \sqrt{x-1} \quad x \geq 1$

(ii) $f(x^2+1) = (x^2+1)^2+1 = \frac{185}{16}$

$x^2+1 = \frac{13}{4}$ or $x^2+1 = -\frac{13}{4}$ (drop)

$x = \frac{3}{2}$

or $x = -\frac{3}{2}$ (drop)

9(i) $\frac{dy}{dx} = 3(3-2x)^2 \times -2$

$= -6(3-2x)^2$

$\left(\frac{dy}{dx}\right)_{x=\frac{1}{2}} = -24$

$\frac{y-8}{x-\frac{1}{2}} = -24 \quad y = -24x+20$

(ii) $\int_0^{\frac{1}{2}} (3-2x)^3 \, dx$

$= \left[-\frac{1}{8}(3-2x)^4\right]_0^{\frac{1}{2}}$

$= -\frac{1}{8}(3-2\times\frac{1}{2})^4 + \frac{1}{8}(3-2\times 0)^4$

$= -2 + \frac{81}{8}$

$= \frac{65}{8}$

$(8+20) \times \frac{1}{2} \div 2$

$= 7$

$\frac{65}{8} - 7 = \frac{9}{8}$

No.

Date

10. a $y=-2(x+2)^2+(x+2)-2$

$=-2x^2-8x-8+x+2-2$

$=-2x^2-7x-8$

b. The graph first ~~reversed~~ reflect to y-aixs and the strech ~~vertically~~ horizontally for $\frac{2}{3}$ to y-aixs.

c(i) $(x-1)^2+(y+2)^2=40$

$A(1,-2)$ $r=2\sqrt{10}$

(ii) $(3-1)^2+(4+2)^2=40.$

$4+36=40$

$40=40$

$\therefore$ B lies on the circle

(iii) $AB: y=kx+b$

$\begin{cases}-2=k+b\\4=3k+b\end{cases}$

$\begin{cases}k=3\\b=-5\end{cases}$

$y=-\frac{1}{3}x+b$

$4=-1+b$

$b=5$

$y=-\frac{1}{3}x+5$