2019 CATHOLIC HIGH SCHOOL CALCULUS B INDIVIDUAL

1. Find $\lim_{x\to\frac{\pi}{4}}\left(\frac{\sin x-\cos x}{\tan x-1}\right)$

2. Find $\lim_{h\to 0}\left(\frac{7^{x+h}-7^{x}}{h}\right)$

3. Find the slope of the tangent to $xy+2x-5y=2$ at $(3,2)$

4. If $f(t)=e^{2t}\sin(3t)$, find $f'(0)$

5. If $u=\ln\sqrt{v^2+2v-1}$, find and simplify $\frac{du}{dv}$

6. Find $\frac{dy}{dx}$ if $y=\frac{1+\sin x}{1-\sin x}$

7. Find $\frac{d^3y}{dx^3}$ if $y=\ln(5x)$

8. Find all critical point(s) for $f(x)=(x-2)(x-3)^4$

9. If $f(x)=x-2\sin x$ on $[0,2\pi]$, give the x coordinate(s) of the relative maximum point(s)

10. At what point on $y=(\ln(x+4))^2$ is the tangent line horizontal?

11. As a spherical balloon is being inflated, its radius r (in cm) is given by $r=3\sqrt[3]{t}$ for $0\le t\le 10$. Find the rate of change after 8 seconds for the volume of the balloon (include units)

12. Find the area of the region bounded by $y=\dfrac{1}{\sqrt{1-x^2}}$ and $y=-\dfrac{1}{\sqrt{1-x^2}}$ on $\left[-\dfrac{1}{2},\dfrac{1}{2}\right]$

13. Find y if $\dfrac{dy}{dx}=24x\left(3x^2-1\right)^3$ and $y(0)=-3$

14. $\displaystyle\int_{\sqrt{e}}^{e}\left(\frac{\ln x}{x}\right)dx$

15. Find $\displaystyle\int \sin^2(x)\cos^3(x)\,dx$