

Q1. Use the definition of derivative to find $f'(x)$ where $f(x) = \sqrt[3]{x+1}$

Q2. Find all equations of the tangent lines to the curve $xy^2 + x^2y = 2$ at $x = 1$

Q3. A spherical snowball is melting at the rate of $4\pi \text{ cm}^3 / \text{sec}$. How fast is the radius changing when it is 5 cm . (10pts) $V = (4/3)\pi r^3$

Q4. Use an appropriate local linear approximation to estimate the value of $\cos 31^\circ$

Q5. Determine whether the function is 1-1 or not

a) $f(x) = x^2 + 8x + 1$

b) $f(x) = 2x^3 + e^x$

Q6. Find a formula for $f^{-1}(x)$ if $f(x) = \begin{cases} 5/2 - x & x < 2 \\ 1/x & x \geq 2 \end{cases}$

Q7. Find $\frac{dy}{dx}$ if $2y^3t + t^3y = 1$ and $\frac{dt}{dx} = \frac{1}{\cos t}$

Q8. Given $f(x) = x^8 - 2x + 3$, find $\lim_{z \rightarrow 1} \frac{f'(z) - f'(1)}{z - 1}$

Q9. Use the table to find

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
0	2	-2	3	1
1	0	4	1	0
2	5	-1	1	3

a) $h'(2)$ if $h(x) = f(g(x))$

b) $F'(0)$ if $F(x) = \frac{f(x)}{4 + g(x)}$

Q10. Find $\frac{dy}{dx}$ a) $\tan^3(xy^2 + y) = x$

Q11. Using differentials, approximate $\sqrt{25.02}$

Q12. Find the equation of the tangent line to $y = \frac{1-x}{1+x}$ at $x = 2$

Q13. Given $f(x) = 2x^5 + x^3 + 1$

a) Show that $f(x)$ is one-to-one

b) Find $f^{-1}(4)$

c) Find $(f^{-1})'(x)$