

MTH U131 Quiz 4 Review

In problems 1-5, find the derivative of each function. Show as much work as possible.

1. $h(x) = \frac{30}{x^5} + 6\sqrt[3]{x^4} = 30x^{-5} + 6x^{4/3}$

$h'(x) = -150x^{-6} + 8x^{1/3}$

2. $g(x) = \frac{55}{1 + 37.52e^{-.245x}} - 20x = 55(1 + 37.52e^{-.245x})^{-1} - 20x$

$g'(x) = -55(1 + 37.52e^{-.245x})^{-2} \cdot (37.52)(-.245)e^{-.245x} - 20$

$g'(x) = 505.582(1 + 37.52e^{-.245x})^{-2} \cdot e^{-.245x} - 20$

3. $k(x) = 10(-4x^{-3} + 5e^{4x^3})^8$

$k'(x) = 80(-4x^{-3} + 5e^{4x^3})^7 (12x^{-4} + 5e^{4x^3} \cdot 12x^2)$

$k'(x) = 80(-4x^{-3} + 5e^{4x^3})^7 (12x^{-4} + 60x^2 e^{4x^3})$

4. $p(x) = 4 \ln(e^{4x^2} + x)$

$p'(x) = \frac{4(8xe^{4x^2} + 1)}{e^{4x^2} + x}$

5. $r(x) = (5(2^x) - 82)(8x^8 - 7x^5)$

$r'(x) = (5(2^x) - 82)(64x^7 - 35x^4) + (8x^8 - 7x^5)(5 \cdot 2^x \ln 2)$

6. The derivative of $m(x) = 3^{(\sqrt{x}-3x)}$ is: (circle one answer)

(i) $3^{(\sqrt{x}-3x)} \ln(3)$

(ii) $3^{(\sqrt{x}-3x)}((1/2)x^{-1/2} - 3)$

(iii) $3^{(\sqrt{x}-3x-1)}$

(iv) $3^{(\sqrt{x}-3x)}((1/2)x^{-1/2} - 3) \ln(3)$

(v) $3^{((1/2)x^{-1/2}-3)} \ln(3)$

7. The formula $P(t) = 1106.55 + 39.47 \ln(t)$ is a model for the population of Hawaii, in thousands of people, where t is the number of years since 1989. Fill in the following table. Show work. Round numerical approximations to three decimal places.

	1990	1994	1999	Units
t	1	5	10	Years
Population	1106.550	1170.075	1197.433	Thousand People
Rate of change of population	39.470	7.894	3.947	Thousand people/year

Substitute into $p(t)$

Substitute into $p'(t) = 39.47/t$