A

Name:______________________________ 1 2 3 Total

Intuitive Calculus Math 11012
Quiz 2 February 18, 2010 R. M. Aron

1. Let $f(x) = (4x^2 - 6x + 5)^{20}$. Compute $f'(x)$.

$f'(x) = 20(4x^2 - 6x + 5)^{19}(8x - 6)$

2. Let $h(t) = (2t^3 + 5t)(\frac{t^2-1}{t+1})$. Compute $h'(t)$.

$h'(t) = (6t^2 + 5)\left(\frac{t^2-1}{t+1}\right) + (2t^3 + 5t)\left[\frac{(t+1)(2t) - (t^2-1)\cdot 1}{(t+1)^2}\right]$

3. A projectile is fired vertically from the ground. At time t, the position $s(t)$ of the projectile is given by $s(t) = 4t^4 + 16t^3 - 16t^2$. Recall that the velocity is the first derivative of the position, and that acceleration is the second derivative of the position.

(a). Find the velocity $v(t)$ of the projectile at time $t = 3$.

$v(t) = s'(t) = 16t^3 + 48t^2 - 32t$

So, $v(3) = 16 \cdot 3^3 + 48 \cdot 3^2 - 32 \cdot 3 = 768$

(b). Find the acceleration $a(t)$ of the projectile at time $t = 3$.

$a(t) = v'(t) = s''(t) = 48t^2 + 96t - 32.$

So, $a(3) = 688$

B

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1. Let $f(x) = (5x^3 - 3x + 5)^{10}$. Compute $f'(x)$.

$f'(x) = 10(5x^3 - 3x + 5)^9 (15x^2 - 3)$

2. Let $h(t) = (4t^3 + 2t)(\frac{t^2+1}{t-1})$. Compute $h'(t)$.

$h'(t) = (12t^2 + 2)\left[\frac{t^2+1}{t-1}\right] + (4t^3 + 2t)\left[\frac{(t-1)(2t) - (t^2+1)\cdot 1}{(t-1)^2}\right]$

3. A projectile is fired vertically from the ground. At time t, the position $s(t)$ of the projectile is given by $s(t) = 3t^4 + 12t^3 - 16t^2$. Recall that the velocity is the first derivative of the position, and that acceleration is the second derivative of the position.

(a). Find the velocity $v(t)$ of the projectile at time $t = 3$.

$v(t) = s'(t) = 12t^3 + 36t^2 - 32t.$

So, $s'(3) = 552$

(b). Find the acceleration $a(t)$ of the projectile at time $t = 3$.

$a(t) = v'(t) = s''(t) = 36t^2 + 72t - 32.$

So, $a(3) = 36 \cdot 3^2 + 72 \cdot 3 - 32 = 508$