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QUIZ 7

MATH 200, SECTION 9
March 19, 2021

Directions: Closed book, closed notes, no calculators.

1. Find the following derivatives.

(a) $\frac{d}{dx}\left[\ \ln(x) + \tan^{-1}(x)\ \right] =$ $\boxed{\frac{1}{x} + \frac{1}{1+x^2}}$

(b) $\frac{d}{dx}\left[\ \ln\left(x^4 - 10x^2 - 1\right)\ \right] = \frac{1}{x^4-10x^2-1}(4x^3-20x) = \boxed{\frac{4x^3-20x}{x^4-10x^2-1}}$

(c) $\frac{d}{dx}\left[\frac{\ln(x)}{x}\right] = \frac{\frac{1}{x}\cdot x - \ln(x)\cdot 1}{x^2} = \boxed{\frac{1-\ln(x)}{x^2}}$

2. An object moving on a line is $s(t) = t^3 + 5t^2 + 1$ meters from a fixed point on the line at time t. What is the object's velocity when its acceleration is 22 meters per second per second?

Velocity: $v(t) = s'(t) = 3t^2 + 10t$ m/sec

Acceleration: $a(t) = v'(t) = 6t + 10$ m/sec^2

Acceleration is 22 m/sec^2 when $a(t) = 22$

$6t + 10 = 22$

$6t = 12$

$t = 2$ sec.

So acceleration is 22 m/sec^2 at time $t = 2$ sec.

At this time velocity is $v(2) = 3\cdot 2^2 + 10\cdot 2 = \boxed{32 \text{ ft/sec}}$