Calculus 3.5b Warm-up – 10/27/15

1) Calculate dy/dt given dx/dt=-7, x=5, and $y = x^3 + 3x^2$

$$y = x^3 + 3x^2$$

$$\frac{dy}{dt} = 3x^2 \cdot \frac{dx}{dt} + 6x \frac{dx}{dt}$$

$$\frac{dy}{dt} = 3 \cdot (5)^2 \cdot (-7) + 6(5)(-7)$$

$$\boxed{\frac{dy}{dt} = -735}$$

2) Calculate the rate of change in volume of a sphere, when the radius is 4cm, and it is decreasing at a rate of 2cm/min.

$$V = \frac{4}{3}\pi R^3$$

$$V_{sphere} = \frac{4}{3}\pi R^3$$

$$\frac{dV}{dt} = 4\pi \cdot 3R^2 \cdot \frac{dR}{dt}$$

$$\frac{dV}{dt} = 4\pi \cdot (4)^2 \cdot (-2)$$

$$\frac{dV}{dt} = \boxed{-128\pi \ cm^3/min}$$

Agenda
- Warm-up
- 3.5b notes – Related Rates

Assignment 3.5b

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CALCULUS

A 4m Ladder Stands Upright
Against A Vertical Wall. IF
The Foot Of The Ladder Is Pulled
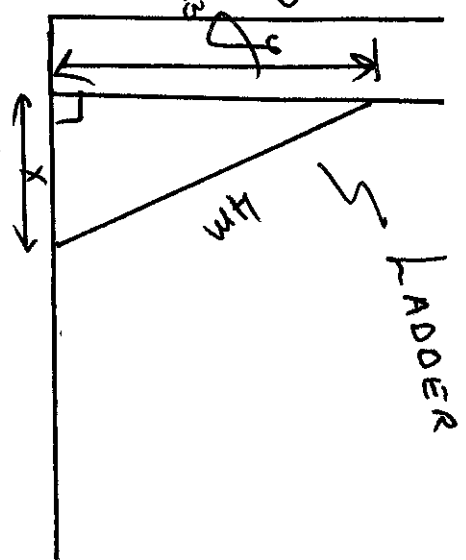Away At A Constant Rate
OF 0.75 m/sec, How Fast Is
The Top Of The Ladder Is Coming Down The Wall
At The Instant It Is

i) 3 meters Above Ground
ii) 1 meter Above Ground.

Give Your Answers Rounded To 3 Decimal Places.

$$\frac{dy}{dt} = ? \qquad \frac{dx}{dt} = 0.75 \, m/sec$$

Ladder, 4m, x, $y=3$

$x^2 + y^2 = 4^2$

$2x\frac{dx}{dt} + 2y\frac{dy}{dt} = 0$

$2x\frac{dx}{dt} + 3\cdot 2\frac{dy}{dt} = 0$

$\sqrt{7}\cdot(0.75) + 3\frac{dy}{dt} = 0$

$\boxed{\dfrac{dy}{dt} = -0.661 \; m/s}$

$x = ?$
$x^2 + y^2 = 16$
$x^2 + 3^2 = 16$
$x^2 = 7$
$x^2 = 16 - 9$
$x = \sqrt{7}$