Assignments for the week of 10/3:

- Read 2.5-2.6
- 45 minutes of Khan Academy
- Textbook assignment due Friday, 10/14:
  2.5 # 1-39 odd; 43, 47 - Implicit Differentiation
  2.6 # 15-23 odd - Related Rates
  2.6 # 25, 27, 35 - Related Rates (more challenging problems)

- Upcoming:

3.1 # 17-35 odd - Absolute Extrema on an Interval
3.2 # 9-21 odd - Rolle's Theorem
3.2 # 33-45 odd - Mean Value Theorem
3.3 # 17-39 odd - Increasing, Decreasing, and Relative Extrema
3.4 #15-39 odd - Inflection Points and Concavity

6th per. solutions:

1. e
2. d
3. b
4. b
5. c
6. c
7. e
8. c
9. c
10. d
11. a
12. b
13. c
14. a
15. e
16. d

8th per. solutions:

1. b	7. e	12. b
2. a	8. d	13. a
3. b	9. b	14. c
4. d	10. e	15. c
5. c	11. c	16. a
6. b		

$y^4 + 3xy + x = 2$, $(2, 0)$

$\frac{d}{dx}[\quad\quad] = \frac{d}{dx}[2]$

$y' = \sim$

$y'|_{(2,0)}$

$$\ln\left(\frac{e^{5x}+1}{e^{2x}+1}\right) = \ln\left(e^{5x}+1\right) - \ln\left(e^{2x}+1\right)$$

$$y' = \frac{1}{e^{5x}+1}\cdot e^{5x}\cdot 5 - \frac{1}{e^{2x}+1}\cdot e^{2x}\cdot 2$$

$$= \frac{5e^{5x}}{e^{5x}+1} - \frac{2e^{2x}}{e^{2x}+1}$$

$$y = \frac{3}{5}(\sec x)^2$$

$$y' = \frac{6}{5}\sec x \cdot \sec x \tan x$$

$$\frac{\Delta s}{\Delta t} = \frac{\left(-16(4)^2+1372\right)-\left(-16(3)^2+1372\right)}{4-3}$$

$$s(t) = -16t^2 + 1372$$

$$= \frac{-16(16)+16(9)}{1} = -112$$

2.6 Related Rates

18. $V = \frac{4}{3}\pi r^3$

$\frac{dr}{dt} = 2\ \text{in/min}$

$\frac{dV}{dt} = ?$ when $r = 6$ in

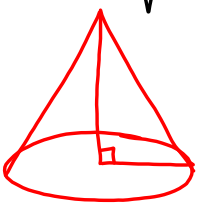
$$\frac{d}{dt}[V] = \frac{d}{dt}\left[\frac{4}{3}\pi r^3\right]$$

$$\frac{dV}{dt} = \frac{4}{3}\pi\left(3r^2\right)\cdot\frac{dr}{dt}$$

$$= 4\pi(6\text{ in})^2 \cdot \frac{2\text{ in}}{\text{min}}$$

$$= \boxed{288\pi\ \frac{\text{in}^3}{\text{min}}}$$

22. $V = \frac{1}{3}\pi r^2 h$



$\frac{dr}{dt} = 2$ in/min

$h = 3r$

$\frac{dV}{dt} = ?$ when $r = 6$ in

$V = \frac{\pi}{3} r^2 (3r)$

$V = \pi r^3$

~~$\frac{d}{dt}[V] = \frac{d}{dt}\left[\frac{1}{3}\pi r^2 h\right]$~~

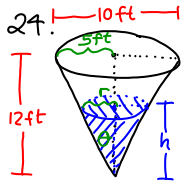
~~$\frac{dV}{dt} = \frac{2\pi}{3} r \cdot \frac{dr}{dt} h + \frac{1}{3}\pi r^2 \cdot \frac{dh}{dt}$~~

$\frac{dV}{dt} = 3\pi r^2 \cdot \frac{dr}{dt}$

$= 3\pi (6\text{ in})^2 \cdot \frac{2\text{ in}}{\text{min}}$

$= \boxed{216\pi \text{ in}^3/\text{min}}$

24.



$\frac{dV}{dt} = 10 \text{ ft}^3/\text{min}$

$\frac{dh}{dt} = ?$ when $h = 8$ ft

$\frac{5}{12} = \frac{r}{h}$

$\frac{5h}{12} = r$

$V = \frac{1}{3}\pi r^2 h = \frac{\pi}{3}\left(\frac{5h}{12}\right)^2 \cdot h$

$V = \frac{25\pi}{3 \cdot 144} h^3$

$\frac{d}{dt}[V] = \frac{d}{dt}\left[\frac{25\pi}{3 \cdot 144} h^3\right]$

$\frac{dV}{dt} = \frac{25\pi}{144} h^2 \cdot \frac{dh}{dt}$

$\frac{dh}{dt} = \frac{\frac{dV}{dt}}{\frac{25\pi h^2}{144}} = \frac{144 \cdot \frac{dV}{dt}}{25\pi h^2} = \frac{144 \cdot 10}{25\pi (8)^2}$

$= \frac{3 \cdot 4 \cdot 3 \cdot 4 \cdot 2 \cdot 5}{5 \cdot 5 \cdot \pi \cdot 4 \cdot 2 \cdot 4 \cdot 2}$

$= \boxed{\frac{9}{10\pi} \frac{\text{ft}}{\text{min}}}$