$f(x)=\sqrt{x}$ at $a=4$

$f'(x)=\frac{1}{2\sqrt{x}}$

$f(4)=2$

$f'(4)=\frac{1}{2\sqrt{4}}=\frac{1}{4}$

$L(x)=2+\frac{1}{4}(4.04-4)=2+\frac{1}{4}(0.04)=2+\frac{0.04}{4}=\boxed{2.01}$

$C=2\pi r$

$\frac{dr}{dt}=\frac{2}{\pi}$ cm/s $\quad \frac{dC}{dt}=2\pi\frac{dr}{dt}=2\pi\cdot\frac{2}{\pi}=\boxed{4}$

$f(x)=x^4-8x^2+2 \Rightarrow f'(x)=4x^3-16x=0$

$=4x(x^3-4)=0$

$=4x(x-2)(x+2)=0$

$x=2 \quad x=-2 \quad x=0$

Outside of $[-1,1]$

at $x=0$: $f(x)=0^4-8(0)^2+2=2$

$f(1)=1^4-8(1)^2+2=1-8+2=-5$

$f'(3)=0 \quad f''(3)<0$

$f(x)=\sqrt{x}, [0,36]$

$f(0)=\sqrt{0}=0$

$f(36)\ \sqrt{36}=6=\frac{6-0}{36}=\frac{6}{36}=\frac{1}{6}=0.16667\approx 0.17$ IDK

Question 10: $h=6$ ft $\quad x=8$ ft $\quad d^2=h^2+x^2 \Rightarrow$ Pythag

$\frac{dx}{dt}=-2$ ft/s

$d^2=6^2+8^2=36+64=100=\boxed{10\text{ ft}=d}$

$10\frac{dd}{dt}=8(-2)\frac{dx}{dt}$

$\frac{10\frac{dd}{dx}}{10}=\frac{-16}{10}=\boxed{\frac{dd}{dx}=-1.6\text{ ft/s}}$

Question 11:

$F'(x) = \frac{x-4}{3(x-6)^{1/3}}$ $F''(x) = \frac{2x-14}{9(x-6)^{4/3}}$

(a): $f'(x) = 0 = \frac{x-4}{3(x-6)^{1/3}} = 0 = x-4 = 0$

$+4 \quad +4$

$x = 4$

$F''(4) = \frac{2(4)-14}{9(4-6)^{4/3}} = \frac{8-14}{9(-2)^{4/3}} = \frac{-6}{9 \cdot 2^{4/3}}$ $2^{4/3}$ is > 0 so $f''(4) < 0$

~~x=4 is a maximum~~

no local minimum

(b): From (a) $x=4$ is a local max as $f''(4) < 0$

(c): $f' > 0$ $f'' < 0$

$\frac{2x-14}{9(x-6)^{4/3}} > 0$ $\frac{2x-14}{9(x-6)^{4/3}} < 0$

$2x-14 > 0$ $2x-14 < 0$

$x > 7$ $x < 7$

$(7, \infty)$ $(-\infty, 7)$

concave up concave down