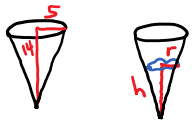
Marks on D2L

Quiz Grade (out of 5)
Test " 45

Term Mark = $\frac{(\text{Quiz} + \text{Test})}{50}$

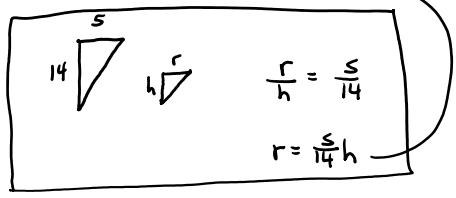
(9)



$\frac{dV}{dt} = -2\ m^3/h$

$\frac{dh}{dt} = ?$ $h = 6$

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



$V = \frac{1}{3}\pi\left(\frac{5}{14}h\right)^2 h$

$V = \frac{1}{3}\pi\left(\frac{5}{14}\right)^2 h^3$

$\frac{dV}{dt} = \frac{dV}{dh} \cdot \frac{dh}{dt}$

$\frac{dV}{dt} = \pi\left(\frac{5}{14}\right)^2 h^2 \frac{dh}{dt}$

Sub $\frac{dV}{dt} = -2$ $h = 6$:

$-2 = \pi\left(\frac{5}{14}\right)^2 36 \frac{dh}{dt}$

$\frac{dh}{dt} = \frac{-2}{36\pi}\left(\frac{14}{5}\right)^2$

≈ -0.14 m/h

(10) b) $f(x) = x^8 - 4x^6$

$f'(x) = 8x^7 - 24x^5$

$f''(x) = 56x^6 - 120x^4$

Set $f''(x) = 0$

$$56x^6 - 120x^4 = 0$$

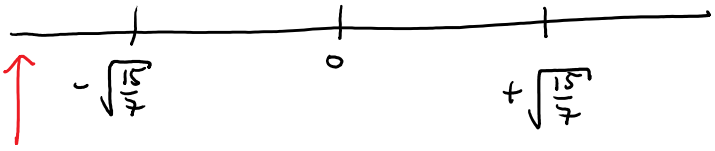
$$8x^4(7x^2 - 15) = 0$$

$x = 0$ or $7x^2 - 15 = 0$

$$7x^2 = 15$$

$$x^2 = \frac{15}{7}$$

$$x = \pm\sqrt{\frac{15}{7}}$$



$f''(-2) > 0$

f''	⊕	⊖	⊖	⊕
f	∪	∩	∩	∪

Two points of inflection

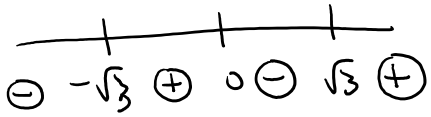
$\left(-\sqrt{\frac{15}{7}}, -18.27\right)$

$f = x^8 - 4x^6$

$\left(\sqrt{\frac{15}{7}}, -18.27\right)$

Aside: $f' = 0$

$x = \pm\sqrt{3}, 0$



(12) $\boxed{f(x) \approx f(a) + f'(a)(x-a)}$

$f(x) = \sin x$

$f'(x) = \cos x$

$x = \frac{5\pi}{18}$ or $\frac{5\pi}{18} \times \frac{180^\circ}{\pi} = 50^\circ$

a: near x, "nice value"

$$\boxed{a = 45^\circ = \frac{\pi}{4}}$$

$f(a) = \sin\frac{\pi}{4} = \frac{1}{\sqrt{2}}$

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

Plug in:

$$\sin\frac{5\pi}{18} \approx \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}}\left(\frac{5\pi}{18} - \frac{\pi}{4}\right)$$

$$\approx 0.77$$

(13) $f(x) = [\csc(2x)]^2 + \tan^{-1}(5x)$

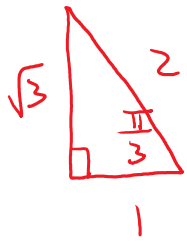
$$f'(x) = 2\csc(2x) \cdot \frac{d}{dx}[\csc(2x)] + \frac{1}{1+(5x)^2} \cdot 5$$

$$= 2\csc(2x)[-2\csc(2x)\cot(2x)] + \frac{5}{1+25x^2}$$

$$f'\left(\frac{\pi}{6}\right) = -4\csc^2\left(\frac{\pi}{3}\right)\cot\left(\frac{\pi}{3}\right) + \frac{5}{1+25\left(\frac{\pi}{6}\right)^2}$$

$\csc \frac{\pi}{3} = \frac{2}{\sqrt{3}}$

$\cot \frac{\pi}{3} = \frac{1}{\sqrt{3}}$



$$= -4\left(\frac{4}{3}\right)\left(\frac{1}{\sqrt{3}}\right) + \frac{5}{\left(1+25\left(\frac{\pi}{6}\right)^2\right)}$$

$$= -2.4$$

(14) $f = \log_2(x^2+5x+1) + 2^{4x}$

$$f' = \frac{1}{\ln 2} \cdot \frac{1}{x^2+5x+1} \cdot (2x+5) + \ln 2 \cdot 2^{4x} \cdot 4$$

$$f'(0) = \frac{5}{\ln 2} + 4\ln 2$$