

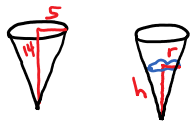
Marks on D2L

Quiz Grade (out of 5)

Test " 45

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

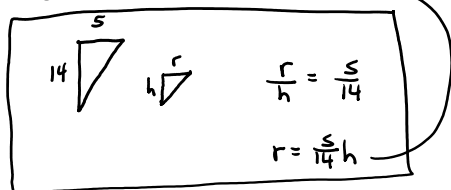
9



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

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

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



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

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

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

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

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

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

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

$$\approx -0.14 \text{ m/h}$$

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

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

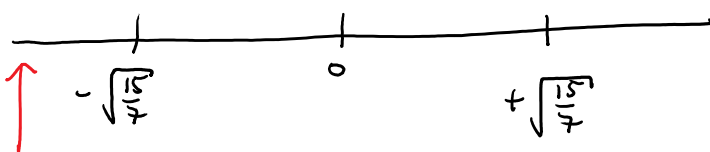
$$f''(x) = 56x^6 - 120x^4$$

$$\text{Set } f''(x) = 0$$

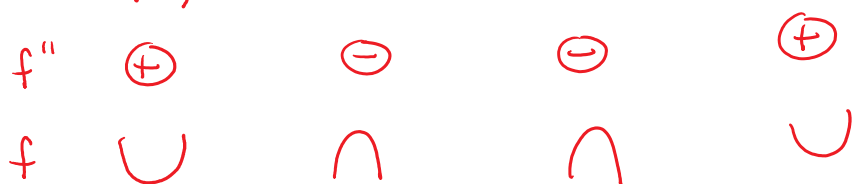
$$56x^6 - 120x^4 = 0$$

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

\swarrow \downarrow
 $x=0$ $7x^2 - 15 = 0$
 $7x^2 = 15$
 $x^2 = \frac{15}{7}$
 $x = \pm \sqrt{\frac{15}{7}}$



$f''(-2) > 0$



Two points of inflection

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

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

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

Aside: $f' = 0$
 $x = \pm\sqrt{3}, 0$

A horizontal number line with three tick marks. The first tick mark on the left is labeled $-\sqrt{3}$. The middle tick mark is labeled 0 . The second tick mark on the right is labeled $\sqrt{3}$. Below the line, the signs are: \ominus for $x < -\sqrt{3}$, \oplus for $-\sqrt{3} < x < 0$, \ominus for $0 < x < \sqrt{3}$, and \oplus for $x > \sqrt{3}$.

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

$f(x) = \sin x$

$$f'(x) = \cos x$$

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

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

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

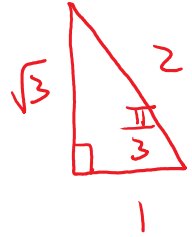
$$f'(x) = 2 \csc(2x) \cdot \frac{d}{dx}[\csc(2x)] + \frac{1}{1+(5x)^2} \cdot 5$$

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

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

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

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



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

$$= -2.4$$

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

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

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