

M1170 W02 Test 2 Solutions

Wednesday, November 18, 2020 2:32 PM

#1) ① H.A. is $y = 2 \therefore c = 2$

① $(0, 6)$: $6 = b + 2 \therefore b = 4$

① $(1, 8)$: $8 = 4a + 2 \therefore a = \frac{3}{2}$

① $\therefore f(x) = 4\left(\frac{3}{2}\right)^x + 2$

#2) $A = Pe^{rt}$

① $30,000 = Pe^{0.045(4)}$

① $\therefore P = 30,000 e^{-0.18} \approx \$25,058.11$

#3) $0 = xe^x - 2e^x$

① $0 = e^x(x - 2)$

$\therefore x - 2 = 0$ since $e^x > 0$

① $x = 2$

#4) $0 = \log_a 3b$

$\therefore 3b = 1$

① $b = \frac{1}{3}$

$2 = \log_a 4$

$$2 = \log_a 4$$

$$(1) a^2 = 4$$

$$\therefore a = 2$$

$$(1) \therefore f(x) = \log_2 \left(\frac{1}{3} x \right)$$

$$\#5) \ln x = 1 - \ln(x+4) = \ln e - \ln(x+4)$$

$$(1) \ln x = \ln \left(\frac{e}{x+4} \right)$$

$$(1) x = \frac{e}{x+4}$$

$$x^2 + 4x - e = 0$$

$$x = \frac{-4 \pm \sqrt{16 + 4e}}{2}$$

$$(1) = -2 \pm \sqrt{4 + e}$$

$$(1) \therefore \text{only } -2 + \sqrt{4 + e} \text{ is a solution}$$

$$\#6) 60 = \frac{120}{1 + 200e^{-0.2t}}$$

$$(1) 2 = 1 + 200e^{-0.2t}$$

$$\frac{1}{200} = e^{-0.2t}$$

$$(1) t = \frac{\ln \left(\frac{1}{200} \right)}{-0.2} = \frac{\ln 200}{0.2}$$

① $\approx 26.5 \text{ years}$

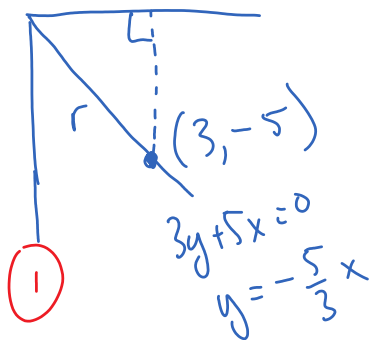
#7) $\frac{\pi}{2} - \frac{\pi}{6}$

① $= \frac{\pi}{3}$

#8) $\theta = 140^\circ \cdot \frac{\pi \text{ rad}}{180^\circ}$

① $= \frac{7\pi}{9}$

#9)

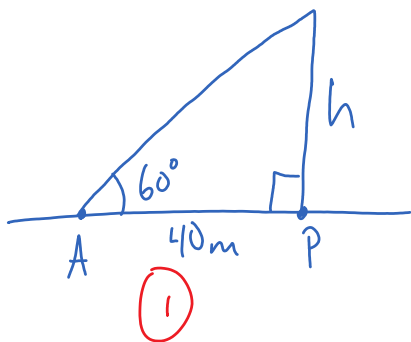


$9 + 25 = r^2$

① $r = \sqrt{34}$

① $\csc \theta = \frac{r}{y} = -\frac{\sqrt{34}}{5}$

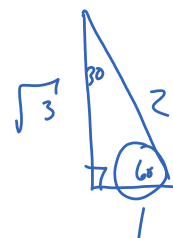
#10)



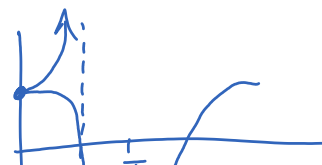
① $\tan 60^\circ = \frac{h}{40}$

$\therefore h = 40 \tan 60^\circ$
 $= 40\sqrt{3}$

① $\approx 69.3 \text{ m}$

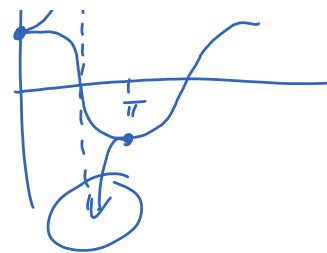
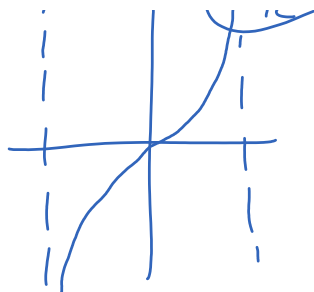


#11) a) ① ∞



#11) a) ① ∞

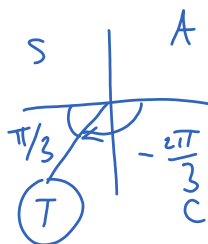
b) ① $-\infty$



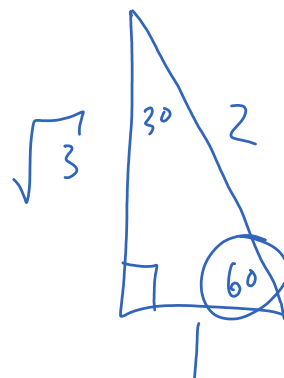
#12) $\sin\left(-\frac{2\pi}{3}\right)$

① $= -\sin\frac{\pi}{3}$

① $= -\frac{\sqrt{3}}{2}$



* must use ref. angle *



#13) ① $\theta = \cos^{-1}\left(\frac{1}{2.3018}\right) \approx 64.3^\circ$

① $\therefore \theta = 115.7^\circ$ or 244.3°



#14) Period $= \pi = \frac{2\pi}{b}$

① $\therefore b = 2$

Phase Shift $= -\frac{\pi}{2} = -\frac{c}{b} = -\frac{c}{2}$

① $\therefore c = \pi$

① Amp. $= 3 = |a| \therefore a = 3$

① $\therefore y = 3\cos(2x + \pi)$

$$\textcircled{1} \therefore y = 3 \cos(2x + \pi)$$

#15/ $\text{Period} = 2\pi = \frac{\pi}{b}$

$$\textcircled{1} \therefore b = \frac{1}{2}$$

Vert. Exp; Vert. Refl.

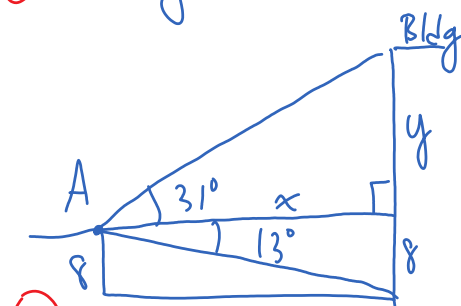
$$\textcircled{1} \therefore a = -2$$

$$\text{Shift} = -\frac{\pi}{2} = -\frac{c}{\frac{1}{2}} = -2c$$

$$\textcircled{1} \therefore c = \frac{\pi}{4}$$

$$\textcircled{1} \therefore y = -2 \tan\left(\frac{1}{2}x + \frac{\pi}{4}\right)$$

#16/



$\textcircled{1}$

$$\textcircled{1} \tan 13^\circ = \frac{8}{x}$$

$$\therefore x = 8 \cot 13^\circ$$

$$\textcircled{1} \tan 31^\circ = \frac{y}{x} = \frac{y}{8 \cot 13^\circ}$$

$$\textcircled{1} \therefore y = 8 \tan 31^\circ \cot 13^\circ \approx 20.82 \text{ m}$$

$$\textcircled{1} \therefore \text{height} = y + 8 = 28.82 \text{ m}$$