Exam 2 Study Guide

Vertical Asymptotes: Factor remains in denominator

Hole: Factors in numerator and denominator cancel

Zero: Factor remains in numerator

Horizontal: If the denominator leading term degree is bigger than the numerator then

HA $y = 0$

$$f(x) = \frac{1}{x+1} \Rightarrow \overset{HA}{y = 0}$$

If the degree is the same for numerator & denominator leading term, then steal the coefficients.

$$f(x) = \frac{2x^2+1}{\quad} \quad HA$$

$$f(x) = \frac{2x^2+1}{3x^2+x+1} \Rightarrow \overset{HA}{y = \frac{2}{3}}$$

Slant Asymptote: Only when the degree of the numerator's leading term is 1 more than the denominators.

$$f(x) = \frac{x^3+1}{x^2+1} \Rightarrow \text{Slant}$$

To find synthetic or long division

(9a) $f(x) = \frac{2x}{x-3}$

VA: $x-3=0$, $x=3$ HA: $y = \frac{2}{1} = 2$

(9i) $f(x) = \frac{x+3}{x^2+8x+15} = \frac{\cancel{x+3}}{(\cancel{x+3})(x+5)}$

Hole: $x=-3$ HA: $y=0$

VA: $x=-5$

VA: $x = -5$

End Behavior

Leading term is odd

If the coefficient is positive

$[x \to \infty, f(x) \to \infty$

$x \to -\infty, f(x) \to -\infty]$

Leading term is odd and the coefficient is negative

$[x \to \infty, f(x) \to -\infty$

$x \to -\infty, f(x) \to \infty]$

Leading term is even and coefficient is positive

$x \to \infty, f(x) \to \infty$

$x \to -\infty, f(x) \to \infty$

Leading term is even and coefficient is negative

$x \to \infty, f(x) \to -\infty$

$x \to -\infty, f(x) \to -\infty$

(10 a) $f(x) = 3x(x-4)^2(x+1)$

Leading term is $3x^4 \to$ even

Leading term is $6x^5$

positive

$\Rightarrow$ $x \to \infty$, $f(x) \to \infty$ and
$x \to -\infty$, $f(x) \to \infty$

(10b) $f(x) = -2x^2(x+5)(x-3)^2$

Leading term is $-2x^5$ $\to$ odd

negative

$\Rightarrow$ $x \to \infty$, $f(x) \to -\infty$
$x \to -\infty$, $f(x) \to +\infty$

(11a) Zero: $x = -6$ and $x = 2$

$$\frac{(x+6)(x-2)}{}$$

A ~~B~~ C D E

VA: $x = 4$

$$\frac{(x+6)(x-2)}{x-4}$$

Hole: $x = -3$

$$\frac{(x+6)(x-2)(x+3)}{}$$

$$\frac{(x+6)(x-2)(x+5)}{(x-4)(x+3)}$$

HA: $y=-1 \Rightarrow$ ① Leading coefficient Top & Bottom is same

② Coefficients divide and equal -1

For condition A isn't answer

(C) is answer

(12) (a) VA: $x=3$

Hole: $x=-2$

$$\frac{(x+2)}{(x+2)(x-3)}$$

[Answer is D fix typo Alexandra]

Exam 3 Study Guide

(1a) Find f^{-1} of $f(x)=3x-7$.

$x=3y-7$

$\frac{x+7}{3}=\frac{3y}{3}$

$$y = f^{-1}(x) = \frac{3}{3}x + \frac{7}{3}$$

(2a) $f(5) = -2$

$5 = f^{-1}(-2) = ?$

(2b) $f(-4) = 11$

$-4 = f^{-1}(11)$

(2e) $f^{-1}(-3) = 1$

$-3 = f(1)$

(3e) $\log_3(-3)$ DNE

(3g) $\ln(-1)$ DNE

} log or ln of a negative never exist

(4a) $\ln(5) = x$

$e \quad e$

$5 = e^x$

(4b) $\log_3(7) = x$

$3 \quad 3$

$7 = 3^x$

(4e) $f(x) = \log_5(x)$

(4g) $f(x) = \ln(x)$

(4e) $f(x) = \log_5(x)$

$f^{-1}(x) = 5^x$

(4g) $f(x) = \ln(x)$

$f^{-1}(x) = e^x$

(6 and 7) If you have logs on both sides cancel them

If you have e's on both sides cancel them.

(6c) $\ln(x^2-1) = \ln(5)$

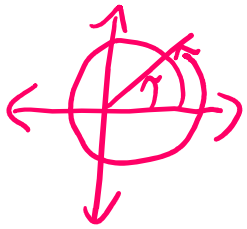
$x^2 - 1 = 5$

$x^2 = 6$

$x = \pm\sqrt{6}$

(8) Coterminal

$\theta + 360°$ or $\theta - 360°$



$[\theta + 2\pi$ or $\theta - 2\pi]$

(a) $\theta = 45°$

$\theta_1 = 45° + 360° = 405°$

$\theta_1 = 45° + 360° = 405$

$\theta_2 = 45° - 360° = -315°$

(d) $\theta = \frac{\pi}{4}$

$\theta_1 = \frac{\pi}{4} + 2\pi = \frac{\pi}{4} + \frac{8\pi}{4} = \frac{9\pi}{4}$

$\theta_2 = \frac{\pi}{4} - 2\pi = \frac{\pi}{4} - \frac{8\pi}{4} = -\frac{7\pi}{4}$

(9) Reference Angles

Q1: $\theta_R = \theta$

(a) $\theta = \theta_R = 35°$

Q2: $\pi - \theta = \theta_R$

$180° - \theta = \theta_R$

(b) $\theta_R = 180° - 145°$

$= 35°$

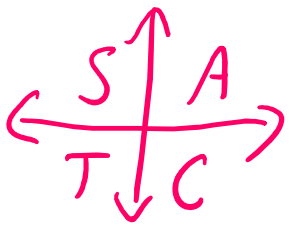
Q3: $\theta - \pi = \theta_R$

$\theta - 180° = \theta_R$

Q4: $2\pi - \theta = \theta_R$

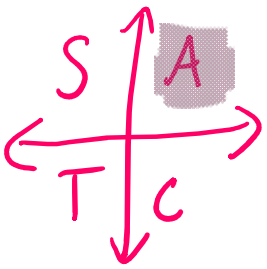
$360° - \theta = \theta_R$

	0	$\pi/6$	$\pi/4$	$\pi/3$	$\pi/2$
sin	0	$1/2$	$\sqrt{2}/2$	$\sqrt{3}/2$	1
cos	1	$\sqrt{3}/2$	$\sqrt{2}/2$	$1/2$	0



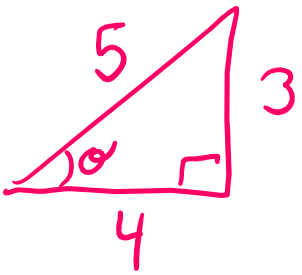
(11a) Find $\tan\theta = +$?

$\sin\theta = 3/5$ $\cos\theta > 0$



(cos, sin)

$\tan\theta = \frac{3}{4}$



Graphs: sine has (0,0) as a pt

cosine has (0, 1) as a pt