Exam 1

1 (a) $m = \frac{8-(-3)}{5-7} = -\frac{11}{2}$, $\Rightarrow$

$y - 8 = -11/2(x-5) \Rightarrow$ **$y = -11/2x + 71/2$**

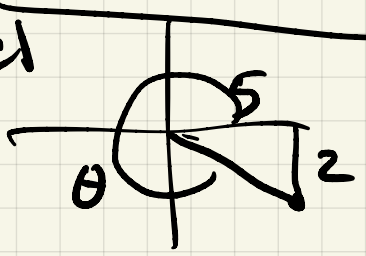
y int **$y = 71/2$** x int $-11/2x + 71/2 = 0 \Rightarrow$

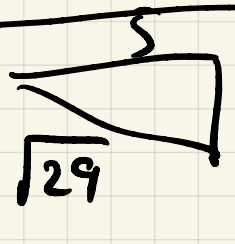
$+11x = 71 \Rightarrow$ **$x = 71/11$**

(b) $e^{4x+7} = 50 \Rightarrow 4x+7 = \ln 50 \Rightarrow$

$$x = \frac{-7 + \ln 50}{4}$$

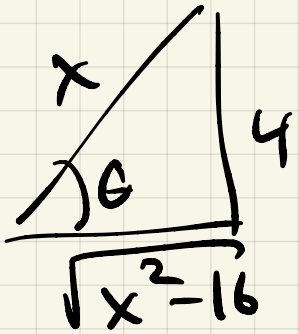
(c)





so $\cos\theta = \frac{5}{\sqrt{29}}$

(d)



$\theta = \arcsin 4/x$

$$\tan\theta = \frac{4}{\sqrt{x^2-16}}$$

(e) domain $3x+6 > 0 \Rightarrow x > -1/2$

$x \neq 5$

Dom $(-\frac{1}{2}, 5) \cup (5, \infty)$

y int: $y = \frac{\ln 6}{-5}$

x-int $\ln(3x+6) = 0$

$3x+6 = 1$

$x = -5/3$

2 (a) $\lim_{x\to -3^+} \frac{x^2+x-6}{x^2-9} = \lim_{x\to -3^+} \frac{(x+3)(x-2)}{(x+3)(x-3)} =$

$\frac{-5}{-6} = 5/6$

(b) $\lim_{x\to 0^+} \frac{x^2+x-6}{x^2-9} = \frac{-6}{-9} = \frac{2}{3}$

(c) $\lim_{x\to 3^+} \frac{(x-2)}{(x-3)} = \frac{1}{0^+} = +\infty$

(d) $\lim_{x\to 5} \frac{(\sqrt{x+11}-4)(\sqrt{x+11}+4)}{(x-5)(\sqrt{x+11}+4)} =$

$\lim_{x\to 5} \frac{x+11-16}{(x-5)(\sqrt{x+11}+4)} = \lim_{x\to 5} \frac{1}{\sqrt{x+11}+4} = \boxed{1/8}$

(e) $\lim_{x\to 0} \frac{3\sin 4x}{7x} = \lim_{x\to 0} \frac{3\cdot 4}{7} \frac{\sin 4x}{4x} = \frac{12}{7}$

(f) $\lim_{x\to \infty} \frac{3x^2-4x+6}{7x^2+8} = \lim_{x\to \infty} \frac{3-4/x+6/x^2}{7+8/x^2} = \frac{3}{7}$

(g) $\lim_{x\to \infty} \frac{3x+1}{6x^2+11} = \lim_{x\to \infty} \frac{3/x+1/x^2}{6+11/x^2} = 0$

3

x	1.1	.9	1.01	.99	1.001	.999
$f(x)$	.489	.659	.562	.580	.571	.572

x	1.0001	.9999
$f(x)$	.5713	.5715

so $\lim \approx .571$

4 (a) $\lim_{x\to 3^+} f = \lim_{x\to 3^+} \frac{1}{8-x} = \frac{1}{5}$

$\lim_{x\to 3^-} f = \lim_{x\to 3^-} \frac{x}{x^2+2x} = \frac{3}{9+6} = \frac{3}{15} = \frac{1}{5}$

$f(3) = \frac{3}{3^2+6} = \frac{1}{5}$ $\therefore$ f cont at $x=3$

(b) f disc at $x = 5, 0, -2$

$\lim_{x\to 8^-} \frac{1}{8-x} = +\infty$ $\lim_{x\to -2} \frac{x}{x^2+2x} =$

$\lim_{x\to -2} \frac{1}{x+2} = \infty$

$\lim_{x\to 0} \frac{1}{x+2} = \frac{1}{2}$, so $x=0$ removable

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(a)

c	$\lim_{x \to c^-} f$	$\lim_{x \to c^+} f$	$\lim_{x \to c} f$	$f(c)$
-2	2	$+\infty$	DNE	DNE
0	1	1	1	2
2	0	2	DNE	0
4	1	1	1	1

(b) Disc $f = \{-4, -2, 0, 2\}$.