Calculus I

Review:

1. If $a = 2$ and $b = -3$, then $\dfrac{(a-b)^2+b}{(b-2a)^2+a} = ?$

$$\frac{(2-(-3))^2+(-3)}{(-3-2(2))^2+2} = \frac{25-3}{49+2} = \frac{22}{51}$$

2. If $f(x) = x^2+2x+3$, then

$(a-1)(a-1) = a^2-a-a+1 = a^2-2a+1$

A. $f(a-1) = ? = (a-1)^2+2(a-1)+3$

$= a^2-2a+1+2a-2+3$

$= a^2+2$

B. $f(x+2) = ? = (x+2)^2+2(x+2)+3$

$= x^2+4x+4+2x+4+3$

$= x^2+6x+11$

3. Simplify $(27a^{-3}b^{6}c^{3})^{\frac{1}{3}} = ?$ $(b^{6})^{\frac{1}{3}} = b^{2}$

$$= \left(\frac{27b^{6}c^{3}}{a^{3}}\right)^{\frac{1}{3}} = \frac{3b^{2}c}{a}$$ ✓

4. When the function $f(x) = \cot x$ is undefined?

a) $\frac{\pi}{2}$ b) $\frac{\pi}{4}$ c) $-\frac{\pi}{4}$ d) 0 E) None

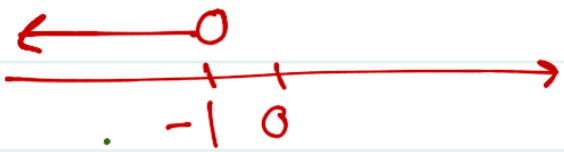
$$\cot x = \frac{\cos x}{\sin x} = \frac{\cos 0}{\sin 0} = \frac{1}{0}$$ undefined

5. Solve inequality $4 - 3x > 7$

$-4 \quad -4$

$$\frac{-3x}{-3} < \frac{3}{-3} \rightarrow x < -1$$

$(-\infty, -1)$

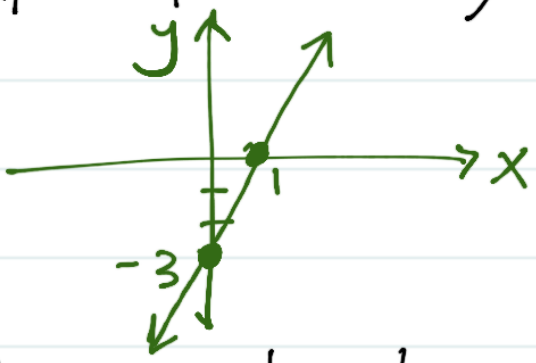


6. write Slope-intercept equation of the line that has slope = 3 and y-int (0, 7).

$y = mx + b$ → $y = 3x + 7$ ✓

m: slope, b: y-int

7. Graph equation by ploting points $y = 3x - 3$



x	y
0	-3
1	0

8. what is the slope of the line passes through points $(2, -3)$ and $(8, 3)$ $\quad m = \frac{y_2 - y_1}{x_2 - x_1}$

(x_1, y_1) (x_2, y_2)

$$m = \frac{3 - (-3)}{8 - 2} = \frac{3+3}{6} = \frac{6}{6} = 1$$ ✓

9. Write the equation of the line passes through $(3, -1)$

a) parallel to line $y = 2x - 3$.

slope $\quad m = 2$

$y = mx + b$

$y = 2x + b \xrightarrow{(x, y) = (3, -1)} -1 = 2(3) + b$

$-1 - 6 = b \quad b = -7$

$y = 2x - 7$ ✓

b) perpendicular to line $y = 2x - 3$. $\quad m = -\frac{1}{2}$

$y = -\frac{1}{2}x + b \xrightarrow{(3, -1)} -1 = -\frac{1}{2}(3) + b$

$-1 + \frac{3}{2} = b \Rightarrow b = \frac{1}{2}$

$y = -\frac{1}{2}x + \frac{1}{2}$ ✓

10. Factor Completely: $a^2 - b^2 = (a-b)(a+b)$

a) $4x^2 - 9$

$= (2x - 3)(2x+3)$ ✓

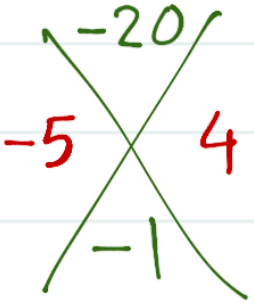
b) $16x^4 - 81$

$= (4x^2 - 9)(4x^2 + 9)$

$= (2x - 3)(2x+3)(4x^2+9)$ ✓

c) $x^2 - 1x - 20$

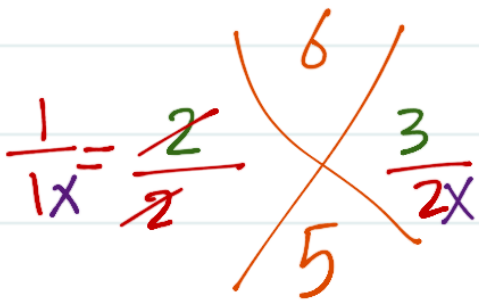
$= (x-5)(x+4)$ ✓



d) $2x^2 + 5x + 3$

6

$= (x+1)(2x+3)$ ✓



11. Find the product

$$\frac{x^2-4}{7} \cdot \frac{x^2-6x+9}{x^2-5x+6} = ?$$

9: $-3 \cdot -3$, -6

$$= \frac{(x-2)(x+2)}{7} \cdot \frac{(x-3)(x-3)}{(x-3)(x-2)}$$

6: $-2 \cdot -3$, -5

$$= \frac{(x+2)(x-3)}{7}$$ ✓

Domain of Functions :

1) Domain of a polynomial function is

All Real Numbers. $(-\infty, \infty)$

$$f(x) = a_n x^n + b_n x^{n-1} + c x^{n-2} + \dots$$

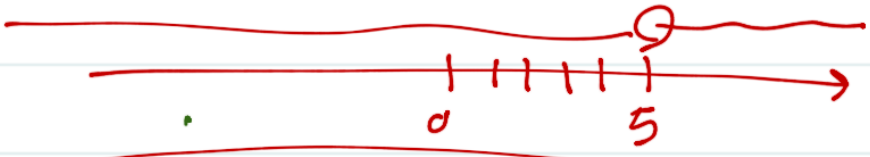
$$f(x) = 3x^5 - 2x^3 + 3x - 10 \qquad D_f = (-\infty, \infty)$$ ✓

2) Domain of a Rational function is all real numbers except for zeros of the denominator. The denominator cannot be zero!

Ex: Domain of $f(x) = \dfrac{7x+10}{x-5}$

$x - 5 \neq 0$

$x \neq 5$



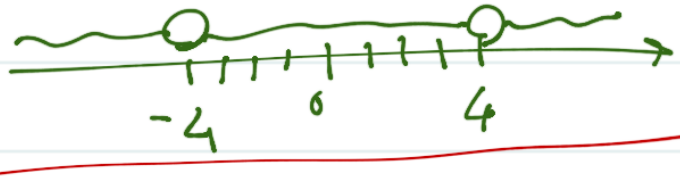
$D_f = (-\infty, 5) \cup (5, \infty)$

Ex: Domain of $g(x) = \dfrac{3}{x^2 - 16}$

$x^2 - 16 \neq 0$

$(x-4)(x+4) \neq 0$

$x \neq 4 \quad x \neq -4$



$D_g = (-\infty, -4) \cup (-4, 4) \cup (4, \infty)$

Ex: Domain $h(x) = \dfrac{2}{x^2+1}$

$x^2 + 1 = 0 \rightarrow x^2 = -1$ No solution

$D_h = (-\infty, \infty)$

3) Domain of $\sqrt{P(x)}$ is all x-value such that $P(x) \geq 0$

Ex: Find the domain of $f(x) = \sqrt{x-3}$

$x - 3 \geq 0 \rightarrow x \geq 3$ $\quad D_f = [3, \infty)$

Ex: Find domain of

$$f(x) = \frac{x+3}{\sqrt{x+5}}$$

$x + 5 > 0$

$x > -5$

$D_f = (-5, \infty)$

$$g(x) = \frac{\sqrt{x-2}}{x-3}$$

$\sqrt{x-2} \rightarrow x - 2 \geq 0 \Rightarrow x \geq 2$

$x - 3 \rightarrow x - 3 \neq 0 \Rightarrow x \neq 3$

$D_g = [2, 3) \cup (3, \infty)$