Legend
work
my thought process

MATH 141: Ungraded Pretest

Name: key

Directions: No calculators. Do everything by hand. Good luck!

1. Simplify the expression $3(x+2) - (2x-1)$

$$3(x+2) - (2x-1) = 3x + 6 - 2x + 1$$

dist law

$$= \boxed{x + 7}$$

2. Simplify by applying laws of exponents: $\frac{\sqrt[3]{x^2}}{x^{-2/3}}$.

$$\frac{\sqrt[3]{x^2}}{x^{-\frac{2}{3}}} = \frac{x^{\frac{2}{3}}}{\frac{1}{x^{\frac{2}{3}}}} = x^{\frac{2}{3}} \cdot \frac{x^{\frac{2}{3}}}{1} = x^{\frac{2}{3}+\frac{2}{3}} = \boxed{x^{\frac{4}{3}}}$$

definitions. dividing by a fraction laws of exponents #1

3. Simplify the expression $3(x+1)^2 \boxed{- (x-2)x}$ equivalent to $+(-1)\cdot(x-2)\cdot x$, three factors.

$$3(x+1)^2 - x(x-2) = 3(x^2 + 2x + 1) - x^2 + 2x$$

commutative law.

$$= 3x^2 + 6x + 3 - x^2 + 2x$$

$$= \boxed{2x^2 + 8x + 3}$$

4. Factor $x^2 + 4x - 5$.

Using new X method (Lecture Note III)

$$\begin{array}{cc} 1 & 5 \\ 1 & -1 \end{array}$$

$1\cdot(-1) + 1\cdot 5 = -4$ ✓

$$\boxed{(x+5)(x-1)}$$

5. Factor $6x^2y + 19xy + 10y$.

Three terms. Try GCF first.

$$y\underbrace{(6x^2 + 19x + 10)}_{\text{use new } x.} = \boxed{y(3x+2)(2x+5)}$$

$$\begin{matrix} 3 & 2 \\ 2 & 5 \end{matrix} \qquad 3 \cdot 5 + 2 \cdot 2 = 19 \checkmark$$

6. Fully simplify $\frac{1}{(x+2)} + \frac{2}{(x+1)^2}$.

convert to global factor.

Find LCD.

$(x+2) \leftarrow$ missing $(x+1)^2$

$(x+1)^2 \leftarrow$ missing $(x+2)$

$$= \frac{(x+1)^2}{(x+1)^2} \cdot \frac{1}{(x+2)} + \frac{2}{(x+1)^2} \cdot \frac{(x+2)}{(x+2)}$$

introduce what's missing

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

$$= \frac{x^2 + 2x + 1 + 2x + 4}{(x+1)^2(x+2)} = \boxed{\frac{x^2 + 4x + 5}{(x+1)^2(x+2)}}$$

7. Can I cross out the x^2 in

$$\frac{x^2+1}{x^2+2}$$

to get $\frac{1}{2}$?

No. x^2 is not a global factor.

It is a global term.

8. Can I cross out the $x - 1$ in

$$\frac{(x-1)(x+2) + 3x^2}{(x-1)(x+3)}$$

to get $\frac{x+2+3x^2}{x+3}$?

No. $(x-1)$ is not a global factor in the numerator.

Isolating variable problem. 4 steps.

9. Solve $a(b + cx) + d = e$ for x.

① Create global terms, remove all parentheses.

$$ab + acx + d = e$$

② collect all terms without x on one side.

$$ab + acx + d = e$$
$$-ab \quad -d \quad -ab \quad -d$$
$$acx = e - ab - d$$

③ Convert x into a global factor.

already global factor. $\quad acx = e - ab - d$

④ Divide both sides by the factors attached to x.

global factors can cancel $\quad \frac{\cancel{ac}x}{\cancel{ac}} = \frac{e - ab - d}{ac}$

$$\boxed{x = \frac{e - ab - d}{ac}}$$

10. Solve $x^2 + 4x - 5 = 0$ for x.

From problem ④:

$$(x + 5)(x - 1) = 0$$

$x + 5 = 0 \qquad x - 1 = 0$

$\boxed{x = -5} \qquad \boxed{x = 1}$

11. Given a function $f(x) = x^2 + x$, evaluate and simplify:

(a) $f(1) = 1^2 + 1 = \boxed{2}$

(b) $f(x + h) = (x + h)^2 + (x + h) = \boxed{x^2 + 2xh + h^2 + x + h}$

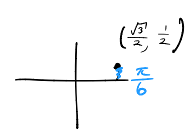
(c) $f(x + h) - f(x)$

$$= \left((x + h)^2 + (x + h)\right) - (x^2 + x)$$

$$= x^2 + 2xh + h^2 + x + h - x^2 - x = 2xh + h^2 + h = \boxed{h(2x + h + 1)}$$

12. If $f(x) = x^2 - x$ and $g(x) = x - 2$, find the function $f \circ g$, expand, then fully simplify.

$$(f \circ g)(x) = f(g(x))$$
$$= f(x - 2)$$
$$= (x - 2)^2 - (x - 2)$$
$$= x^2 - 4x + 4 - x + 2$$
$$= \boxed{x^2 - 5x + 6}$$

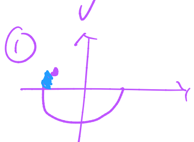


13. Evaluate the following:

- $\sin\left(\frac{\pi}{4}\right) = \boxed{\frac{\sqrt{2}}{2}}$
- $\cos(0) = \boxed{1}$
- $\tan\left(-\frac{7\pi}{6}\right) = -\tan\left(\frac{\pi}{6}\right) = -\frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = -\frac{1}{2} \cdot \frac{2}{\sqrt{3}} = -\frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \boxed{-\frac{\sqrt{3}}{3}}$

Using unit circle (Lecture note 5.1 + 5.2)

① $t = \frac{\pi}{6}$



② tangent negative in quadrant II