

Final Review #4

1)
 $2x^3 + 16$
 $2(x^3 + 8)$ ← SOAP!
 $2(x+2)(x^2 - 2x + 4)$

2)
 $(6x^3 + 3x^2)(2x + 1)$
 $3x^2(2x + 1) + 1(2x + 1)$
 $(3x^2 + 1)(2x + 1)$

3)
 $x^8 - 1$ DOTS
 $(x^4 - 1)(x^4 + 1)$
 $(x^2 - 1)(x^2 + 1)(x^4 + 1)$
 $(x - 1)(x + 1)(x^2 + 1)(x^4 + 1)$

4)
 $(2a - b)^3$
 ${}^3C_3 (2a)^3 (-b)^0 = (1)(8a^3)(1)$
 ${}^3C_2 (2a)^2 (-b)^1 = (3)(4a^2)(-b)$
 ${}^3C_1 (2a)^1 (-b)^2 = (3)(2a)(b^2)$
 ${}^3C_0 (2a)^0 (-b)^3 = (1)(1)(-b^3)$
 $8a^3 - 12a^2b + 6ab^2 - b^3$

5)

$$(x^2 + y^3)^4$$

$${}^4C_4 (x^2)^4 (y^3)^0 = (1)(x^8)(1)$$

$${}^4C_3 (x^2)^3 (y^3)^1 = (4)(x^6)(y^3)$$

$${}^4C_2 (x^2)^2 (y^3)^2 = (6)(x^4)(y^6)$$

$${}^4C_1 (x^2)^1 (y^3)^3 = (4)(x^2)(y^9)$$

$${}^4C_0 (x^2)^0 (y^3)^4 = (1)(1)(y^{12})$$

$$x^8 + 4x^6y^3 + 6x^4y^6 + 4x^2y^9 + y^{12}$$

6)

$$f(x) = 4\sqrt{x} \quad g(x) = x - 6$$

$$(f \circ g)(x)$$

$$4\sqrt{x-6}$$

7)

$$f(x) = 2x^3 - 5$$

$$x = 2y^3 - 5$$

$$\frac{x+5}{2} = \frac{2y^3}{2}$$

$$\sqrt[3]{\frac{x+5}{2}} = \sqrt[3]{y^3}$$

$$\sqrt[3]{\frac{x+5}{2}} = f^{-1}(x)$$

8)

Zeros

$$x = -5 \quad x = 0 \quad x = 3$$

Cross

Cross

Cross

Neither

9)

$$x = -3 \quad x = 0$$

Cross Tangent

Neither

10)

$$\begin{array}{r}
 6x^2 + 7x + 2 \\
 2x+1 \overline{) 12x^3 + 20x^2 + 11x + 2} \\
 \underline{-(12x^3 + 6x^2)} \quad \downarrow \\
 14x^2 + 11x \\
 \underline{-(14x^2 + 7x)} \quad \downarrow \\
 4x + 2 \\
 \underline{-(4x + 2)} \\
 0
 \end{array}$$

Yes!
It divides evenly.

11)

$$\frac{1}{x+1} + \frac{x}{x-6} = \frac{5x-2}{x^2-5x-6}$$

$$\frac{1}{x+1} + \frac{x}{x-6} = \frac{5x-2}{(x-6)(x+1)}$$

$$\frac{x-6 + x^2 + x - \frac{5x+2}{x-6}}{(x+1)(x-6)}$$

$$\frac{x^2 - 3x - 4}{(x-6)(x+1)} = \frac{(x-4)(x+1)}{(x-6)(x+1)} = \boxed{\frac{x-4}{x-6}}$$

12)

$$2^{2x+1} \cdot 2^x = 16$$

$$2^{2x+1} \cdot 2^x = 2^4$$

$$2^{2x+1+x} = 2^4$$

$$3x+1=4$$

$$3x=3$$

$$x=1$$

13)

$$\left(\frac{2a^9 b^{-8}}{3ab} \right)^3$$

$$\frac{2^3 a^{27} b^{-24}}{3^3 a^3 b^3}$$

$$\frac{8a^{24}}{27b^{27}}$$

14)

$$\log_4 a + \frac{1}{2} \log_4 b$$

$$\log_4 a + \log_4 \sqrt{b}$$

$$\log_4 a \sqrt{b}$$

15)

$$\log x - (4 \log y + 5 \log z)$$

$$\log x - (\log y^4 + \log z^5)$$

$$\log x - \log y^4 z^5$$

$$\log \frac{x}{y^4 z^5}$$

16)

$$\frac{x+5}{x^2+4x+3} = \frac{A}{x+3} + \frac{B}{x+1}$$

$$x+5 = A(x+1) + B(x+3)$$

$$x+5 = Ax + A + Bx + 3B$$

$$x = Ax + Bx \rightarrow 1 = A + B$$

$$5 = A + 3B \rightarrow -(5 = A + 3B)$$

$$1 = A + B$$

$$1 = A + B$$

$$-5 = -A - 3B$$

$$1 = A + 2$$

$$-2 = -2$$

$$-1 = A$$

$$-4 = -2B$$

$$\frac{-4}{-2} = \frac{-2B}{-2}$$

$$2 = B$$

$$\frac{-1}{x+3} + \frac{2}{x+1}$$

17)

$$\lim_{x \rightarrow 16} \frac{-4 + \sqrt{x}}{x-16} \cdot \frac{(-4 - \sqrt{x})}{(-4 - \sqrt{x})} =$$

$$\lim_{x \rightarrow 16} \frac{16 - x}{x-16} \cdot \frac{-1}{(-4 - \sqrt{x})} =$$

$$\lim_{x \rightarrow 16} \frac{-1}{-4 - \sqrt{x}} = \frac{-1}{-4-4} = \frac{1}{8}$$

18)

$$\lim_{x \rightarrow 0} \frac{(x-6)^2 - 36}{x} =$$

$$\lim_{x \rightarrow 0} \frac{x^2 - 12x + 36 - 36}{x} =$$

$$\lim_{x \rightarrow 0} \frac{x(x-12)}{x} =$$

$$\lim_{x \rightarrow 0} x + 12 = -12$$