assessment #2 *Show all work!* **November 16, 2021**

precalc **Name:**_______________

1. Use the functions $f(x) = \sqrt{x-4}$ and $g(x) = 3x^2$ to find the specified function:

a. $(\frac{f}{g})(x)$

$$= \frac{\sqrt{x-4}}{3x^2}$$

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

$$= \sqrt{3x^2-4}$$

2. Find the domain for (1b):

$$3x^2 - 4 \geq 0$$

$$3x^2 \geq 4$$

$$x^2 \geq \frac{4}{3}$$

$$x \geq \frac{\sqrt{4}}{\sqrt{3}} = \frac{2}{\sqrt{3}} \approx 1.15$$

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3. Identify the vertex and x-intercepts of the graph of $y = x^2 + 5x + 6$

x	$+2.5$
x^2	$+2.5x$
$+2.5x$	$+6.25$

$y = (x^2 + 5x + 6.25) - 6.25 + 6$

$y = (x + 2.5)^2 - 0.25$

vertex: $(-2.5, -0.25)$

$x^2 + 5x + 6$

$2 + 3 = 5$

$y = (x+2)(x+3)$

$x = -2, -3$

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4. Divide using long division. Include a remainder if necessary: $(x^3 - x - 6) \div (x - 3)$

$$
\begin{array}{r}
x^2 + 3x + 8 \\
x-3 \overline{\big)\, x^3 + 0x^2 - x - 6} \\
\underline{-x^3 + 3x^2 } \\
3x^2 - x \\
\underline{-3x^2 + 9x } \\
8x - 6 \\
\underline{-8x + 24} \\
18
\end{array}
$$

answer:

$x^2 + 3x + 8$, R 18

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5. Sketch the graph of the following function: $f(x) = 2x^3 + 16x^2 + 4x$. Be sure to:
   a. Find the real roots for this function
   b. Apply the leading coefficient test
   c. Find at least two additional points
   d. Sketch an appropriate graph

a. $0 = 2x^3 + 16x^2 + 4x$

$0 = x[2x^2 + 16x + 4]$

roots: $x \approx 0, -7.75, -0.25$

$a = 2,\ b = 16,\ c = 4$

$x = \dfrac{-16 \pm \sqrt{16^2 - 4(2)(4)}}{2 \cdot 2}$

$x = \dfrac{-16 \pm \sqrt{224}}{4}$ $= \sqrt{16}\sqrt{14} = 4\sqrt{14}$

$x = \dfrac{-16 \pm 4\sqrt{14}}{4} = -4 \pm \sqrt{14}$

$x \approx -7.75, -0.25$

b. highest exp: odd
leading coeff: +
↙ . ↗

c. $f(-9) = 130$
$f(-0.1) = -$