Name: _____ _____ / 40

Assessment 4 Instructions:

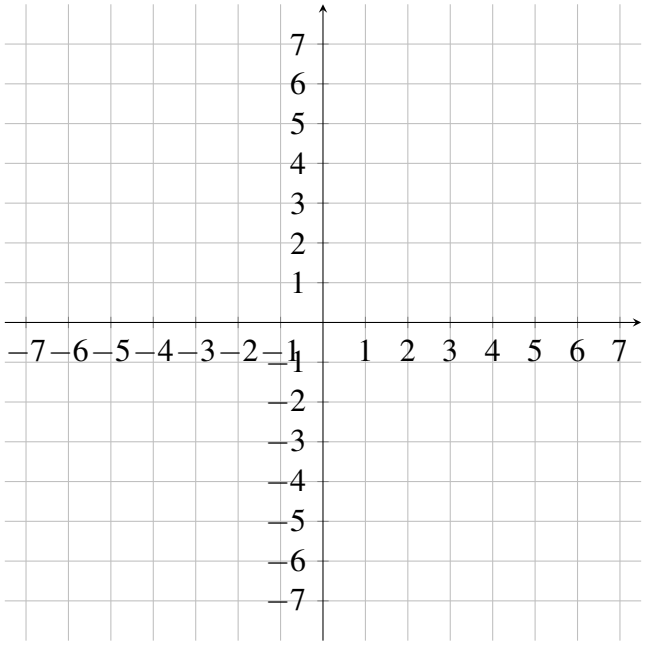
- The AS-4 is 10 problems and is worth 40 points.
- You will have 1 hour to complete AS-4.
- The AS-4 is closed book and closed notes.
- **Calculators are not allowed** on the AS-4.
- Show all your work for full credit and box your final answer.

1. [4 points] For the polynomial function $k(x) = -(x+2)^3(x-1)$

a. determine the behaviour of $k(x)$ as $x \to \pm\infty$

b. identify x- and y-intercepts

c. sketch the graph of $k(x)$



2. [4 points] Solve the following polynomial inequality

$$(x-1)(x+2)(3-x) \leq 0$$

3. [4 points] Use polynomial long division to rewrite

$$\frac{9x^3+2x}{3x-5}$$

in the form $q(x)+\dfrac{r(x)}{d(x)}$.

4. [4 points] Construct the polynomial function with the stated properties:

- third degree
- zeros of -3 with multiplicity 2, and 2 with multiplicity 1
- y-intercept of -6

5. [4 points] Using the **Rational Zero Theorem** list **all** possible rational real zeros of the following polynomial function

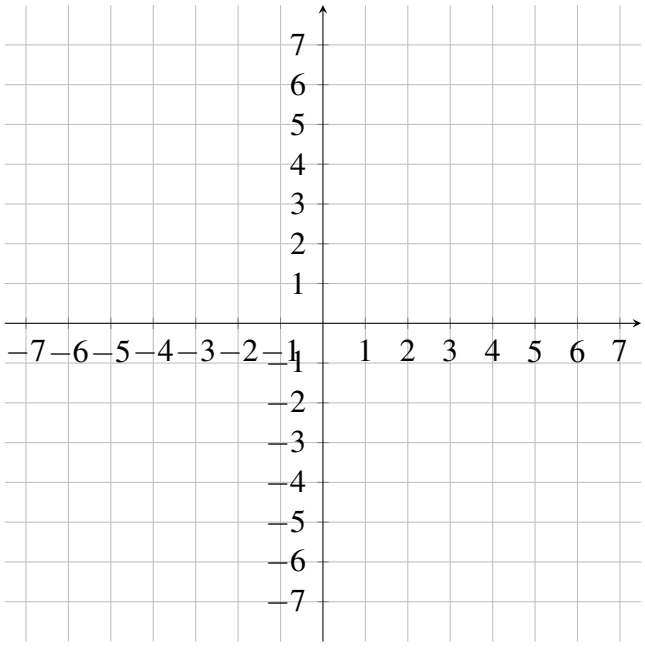
$$f(x) = 2x^3 - 12x^2 + 26x - 40$$

6. [4 points] Use the **Intermediate Value Theorem** to show that there exists at least one real zero between the indicated values of the given polynomial function. (*Hint: calculate* $f(a)$ *and* $f(b)$)

$$f(x) = x^4 - 9x^2 - 14, \quad a = 1, \quad b = 4$$

7. [4 points] Sketch the graph of the factored polynomial function. State **all** x- and y-intercept points.

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



8. [4 points] For the given function $f(x) = \dfrac{x+2}{x^2-9}$

a. Find the domain of $f(x)$

b. Find all *vertical* asymptotes

c. Find all *horizontal* asymptotes

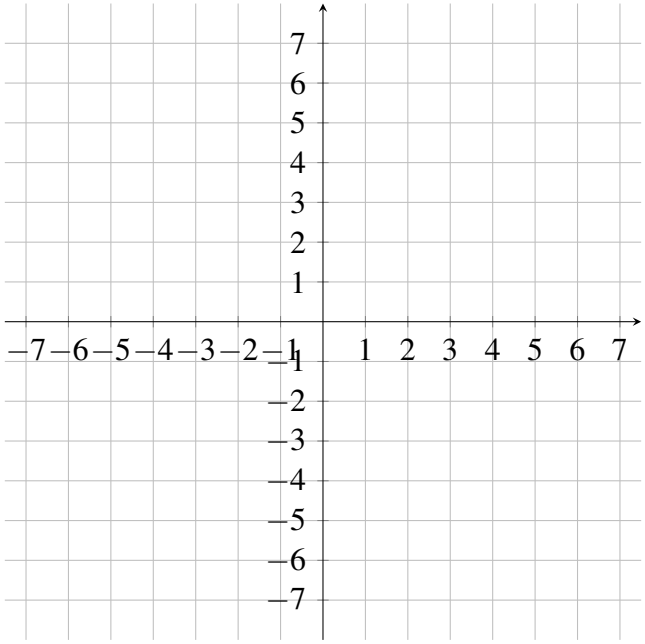
d. Does $f(x)$ have an oblique asymptote? If yes, then state it. If not, then explain why it doesn't have it.

9. [4 points] Solve the following rational inequality

$$\frac{x-7}{x-3} \geq \frac{x}{x-1}$$

10. [4 points]

a. Sketch the graph of the following function $p(x) = \left(\frac{1}{3}\right)^{2-x}$



b. Solve the following exponential equation

$$7^{x^2+3x} = \frac{1}{49}$$