MA 137 Worksheet #10

Sections 3.3 & 3.5
9/17/20

1. Show that each of the following functions has a horizontal asymptote by calculating the given limits:

- $\lim_{x\to\infty} \dfrac{(2+3x)^2}{4-x^2}$
- $\lim_{x\to-\infty} \dfrac{(2+3x)^2}{4-x^2}$
- $\lim_{x\to\infty} \dfrac{\sqrt{8-x+4x^2}}{5x+3}$
- $\lim_{x\to-\infty} \dfrac{\sqrt{8-x+4x^2}}{5x+3}$
- $\lim_{x\to\infty} \dfrac{5x^5+4^{-x/2}}{(7x^3+1)x^2}$
- $\lim_{x\to-\infty} \dfrac{5x^5+4^{-x/2}}{(7x^3+1)x^2}$

2. Let A_1, A_2, B be constants and $P(t) = A_1 + A_2B^t$. Then determine

$$\lim_{t\to-\infty} P(t) \qquad\qquad \lim_{t\to0^-} P(t)$$

3. For $f(x) = x^3 - 3^x + \log(x)$, show that $f(x)$ has a zero on the interval $[2, 3]$.

4. Using IVT, show that $72x^{15} - 37x^4 + 11 = e^x$ has a solution on $[-1, 0]$.