Quiz 9 (Solutions)

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1. Given all of the following information about a function f, sketch its graph. [10]

   - $f(x) = 0$ at $x = -5, x = 0$ and $x = 5$
   - $\lim_{x \to -\infty} f(x) = \infty$
   - $\lim_{x \to \infty} f(x) = -3$
   - $f'(x) > 0$ for $-3 < x < 2$ and for $x > 7$
   - $f'(x) < 0$ for $x < -3$ and $2 < x < 7$
   - $f''(x) > 0$ for $x < 0$ and $5 < x < 8$
   - $f''(x) < 0$ for $0 < x < 5$ and $x > 8$

   [Drawn in class]

2. Find the derivatives of the following functions. No explanation is necessary.

   (a) $x^\pi + \pi^x$ [2]

   Answer: $\pi x^{\pi-1} + \pi^x \ln(\pi)$

   (b) $2e^x - 3x^2\sqrt{x}$ [2]

   Solution: Note that we can simplify the function to $2e^x - 3x^{5/2}$. So the answer is $2e^x - \frac{15}{2}x^{3/2}$.