Mathletics Sample Problems – Calculus

1. What is the linear approximation to $\sqrt{x+3}$ near $x = 0$?

   (a) $\sqrt{3}$

   (b) $\frac{1}{2}x\sqrt{x+3} + \sqrt{3}$

   (c) $\sqrt{3} + \frac{1}{2\sqrt{3}}x$

   (d) $\frac{1}{2\sqrt{3}}$

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2. Find all values of x where $f(x) = (2x+7)^6$ has a horizontal tangent.

   (a) $-\frac{7}{2}$

   (b) 12 and $-\frac{7}{2}$

   (c) $\frac{7}{2}$ and 12

   (d) $\pm\frac{7}{2}$ and 12

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3. Evaluate the following:
$$\lim_{x \to 1} \frac{\sqrt{x} - x^2}{1 - \sqrt{x}}$$

   (a) 0

   (b) 1

   (c) 3

   (d) Undefined