Math Camp Exercises - Day 4

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1. Calculate the area under the curve:
   (a) $\int_0^2 (2+x)dx$
   (b) $\int_{-1}^1 (3x^3 - x^2 + x - 1)dx$
   (c) $\int_1^e (\frac{1}{x})dx$

2. For each of the following, find the partial derivative with respect to both x and z:
   (a) $f(x,z) = 2z^2 + x^2$
   (b) $f(x,z) = z^3 - 2$
   (c) $f(x,z) = xz^2$
   (d) $f(x,z) = x^3z^2 - x$
   (e) $f(x,z) = ln(xz^3 - 3z + x^2)$
   (f) $f(x,z) = \frac{14x^2z^3}{xz}$
   (g) $f(x,z) = \frac{1}{\sqrt{xz^4}}$

3. Find the gradient and the Hessian of the following function:

$$f(x,y,z) = 2xy + 4x^2z^3 - 3y^3z + ln(10)$$