# Math 190 Quiz 5: Solutions

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*The quiz is 15 minutes long and has two questions. No calculators or other aids are permitted. Show all of your work for full credit.*

**Questions:**

1. Find $F(x)$ such that $F'(x) = \frac{2}{\sqrt{x}} - 6x^2 - 3e^x - 2$ and $F(1) = 0$.

   **Solution:** First we rewrite $F'(x)$ as

$$F'(x) = 2x^{-1/2} - 6x^2 - 3e^x - 2.$$

   Now we integrate to see

$$F(x) = 4x^{1/2} - 2x^3 - 3e^x - 2x + C.$$

   To find $C$ we use the fact that $F(1) = 0$, that is

$$\begin{aligned} 0 = F(1) &= 4(1)^{1/2} - 2(1)^3 - 3e^1 - 2(1) + C \\ &= 4 - 2 - 3e - 2 + C \\ &= -3e + C. \end{aligned}$$

   And so, from $0 = -3e + C$ we achieve $C = 3e$. In this way our desired function is

$$F(x) = 4x^{1/2} - 2x^3 - 3e^x - 2x + 3e$$

   as required.

2. Compute the following integral

$$\int \cos x e^{\sin x} dx.$$

   **Solution:** We will proceed by means of substitution. Let $u = \sin x$. In this way we have $du = \cos x dx$ and we transform our integral as follows

$$\int e^{\sin x} \cos x dx = \int e^u du.$$

   At this point we can integrate easily. Observe

$$\begin{aligned} \int e^{\sin x} \cos x dx &= \int e^u du \\ &= e^u + C \\ &= e^{\sin x} + C. \end{aligned}$$

   Our integral is now complete after switching back to $x$.