Math 2300-013: Quiz 4, 9/20/2019

Name: _____ Score: _____

Show your work on all questions to receive full credit.

1. (5 points) Evaluate the following integral:

$$\int x^7 e^{x^4} dx$$

Solution:
Let $u = x^4$, so $du = 4x^3 dx$, and we have $\frac{1}{4}du = x^3 dx$.

$$\int x^7 e^{x^4} dx = \int x^4 e^{x^4} x^3 dx$$
$$= \frac{1}{4}\int u e^u du$$

Need to use integration by parts:

To avoid confusion, I'm first going to switch the variable. Use $t = u$ $(= x^4)$:

$$= \frac{1}{4} t e^t dt$$

Now, let $u = t, du = dt; dv = e^t dt, v = e^t$

$$= \frac{1}{4}(te^t - \int e^t dt)$$
$$= \frac{1}{4}(te^4 - e^t + C)$$

Now, go back to x's:

$$= \frac{1}{4}(x^4 e^{x^4} - e^{x^4} + C)$$

2. (5 points) Suppose that $\int_0^1 f(t)dt = 5$. Calculate the following:

$$\int_0^1 f(1-t)dt$$

Solution: Use a u-sub. $u = 1 - t$, $du = -dt$, so $-du = dt$. Also, when $t = 0$, $u = 1$ and when $t = 1$, $u = 0$. Subbing this all in:

$$\int_0^1 f(1-t)dt = -\int_1^0 f(u)du$$
$$= \int_0^1 f(u)du$$
$$= 5$$