

## Laplace Transforms Homework #2

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**Instructions.** For problems 1 - 10, find the Laplace Transform of each function.

1.  $5 - 8t^3$
2.  $\frac{1}{8} \cos\left(\frac{3}{8}t\right)$
3.  $e^{3t} \cos(2t) - e^t \sinh(5t)$
4.  $\cos(t) - \sin(t)$
5.  $t^7 - t^4 + 5t^2$
6.  $t \sinh(t)$
7.  $\frac{d}{dt} [te^{5t}]$
8.  $\frac{d^2}{dt^2} [\cos(t) + te^t]$
9.  $\int_0^t \cosh(z) \cos(t-z) dz$
10.  $\int_0^t e^z \cos(2z) dz$

**Further Instructions** For problems 11 - 20, find the Inverse Laplace Transform of each function.

11.  $\frac{2}{s^2+k^2}$
12.  $\frac{n!}{(s-k)^{n+1}}; \quad n = 1, 2, 3, \dots$
13.  $\frac{s}{s^2-k^2}$
14.  $\frac{2}{(s^2+1)^2}$
15.  $\frac{s^2+3s+36}{s(s^2+13s+36)}$
16.  $\frac{s^2+4s+36}{(s^2-4)^2}$
17.  $\frac{s^2+2s+53}{(s+2)(s^2+49)}$
18.  $\frac{s^2+3s-18}{s(s^2-6s+9)}$
19.  $\frac{s^2-s+1}{s^3(s+1)}$
20.  $\frac{2s-3}{(s+1)^2+16}$