Laplace Transforms- HW Problems

In problems 1-5 use the definition of a Laplace transform to find the Laplace transform of the given function.

1. $f(t) = t^2 + t$

2. $f(t) = \cos^2(t)$

3. $f(t) = e^{(2t-1)}$

4. $f(t) = 2t \qquad 0 \le t \le 1$
    $ = 0 \qquad 1 < t$

5. $f(t) = 1 \qquad 0 \le t \le 2$
    $ = 0 \qquad 2 < t.$

In problems 6-10 use the Laplace transforms of functions developed in class and the linearity properties of the Laplace transform to find the Laplace transforms of the following functions.

6. $f(t) = 4 - 3t^2$

7. $f(t) = 3\cos(2t) + 2e^{3t}$

8. $f(t) = te^{2t}$ (Hint: Use the definition and integrate by parts first)

9. $f(t) = 4 + \sinh(2t)$

10. $f(t) = t^{\frac{5}{2}} + \sin(3t)$

In problems 11-17 use the Laplace transforms developed in class to find the inverse Laplace transforms of the following functions.

11. $F(s) = \dfrac{3}{s}$

12. $F(s) = \dfrac{1}{s^5}$

13. $F(s) = \dfrac{s}{s^2+9}$

14. $F(s) = \dfrac{3}{s-4}$

15. $F(s) = \dfrac{4-2s}{s^2+16}$

16. $F(s) = \dfrac{s-5}{9-s^2}$

17. $F(s) = -3s^{-1}e^{-4s}$